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SAE OFFICES

Headquarters

29 West 39th St. New York, N. Y.
Telephone: Longacre 5-7170

A. W. Herrington, President

David Beecroft, Treasurer

John A. C. Warner, Secretary and General Manager

West Coast Branch Office

530 West 6th St. Los Angeles, Calif.
Telephone: Vandike 3915

E. F. Lowe, Asst. Gen. Mgr.

Detroit Branch Office for War Activities

917 New Center Bldg. Detroit, Mich.
Telephone: Madison 7495

R. C. Sackett, Staff Representative

SAE Journal

Editorial Office

29 West 39th St. New York, N. Y.
Telephone: Longacre 5-7174

Norman G. Shidle, Executive Editor

Advertising Offices

29 West 39th St. New York, N. Y.
Telephone: Longacre 5-7170

C. B. Whittelsey, Jr., Business Mgr.

E. L. Carroll, Eastern Adv. Mgr.
29 West 39th St. New York, N. Y.

A. J. Underwood, Western Adv. Mgr.
3-210 General Motors Bldg.—Detroit, Mich.
Telephone: Trinity 2-0339

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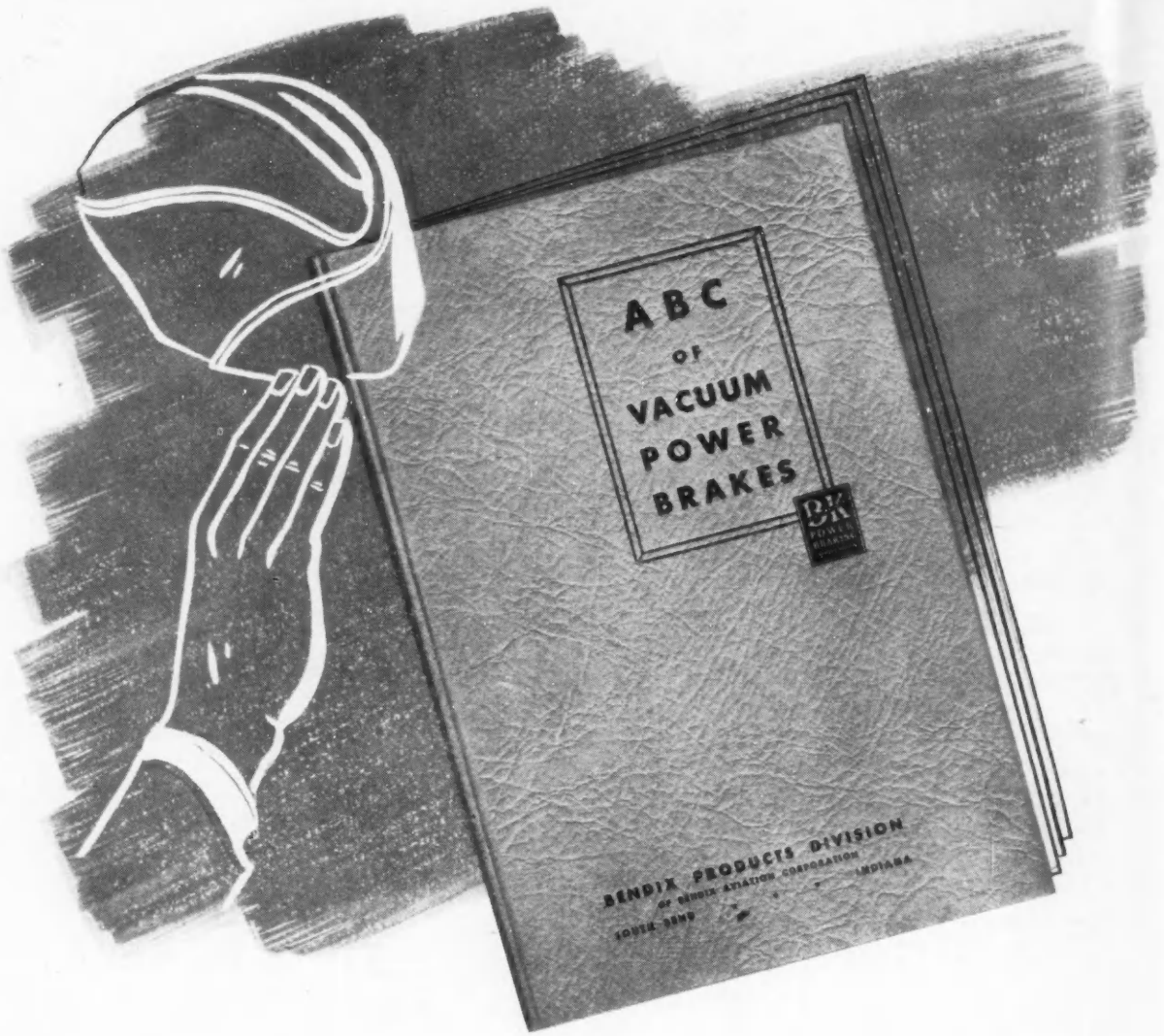

DRAFTED FOR ARMY SERVICE...

When Uncle Sam's Army snapped out an order for one-half of the first edition of the new Bendix book, "ABC of Vacuum Power Brakes"—to be used for basic training in the Quartermaster Corps, Bendix sent its "book to be a soldier."

A small contribution in a very large war, of course — but, it proves again the vital need of *service knowledge* as well as *servicemen* in a war where automotive vehicles rank in importance with guns.

For use in this home front of national transportation the book "ABC of Vacuum Power Brakes" and other Bendix service publications are offered to servicemen free—to serve shoulder to shoulder with the men whose job it is "to keep 'em rolling" over the nation's highways. The fact that the whole automotive service industry must get in and pitch under real handicaps including shortages of men and material, only makes the responsibility greater and the job more important. On this service job to be done, Bendix and Bendix distributors are daily striving to do every possible thing to help servicemen maintain civilian transportation.

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"Straight Down OUR ALLEY"

by LT.-GEN. BREHON B. SOMERVELL
Commanding General, Services of Supply, U. S. Army

UPON returning from England early in June, Gen. Somervell wrote this special message to members of the SAE.

Coming from the man in supreme command of U. S. Army supply services – when establishment of a "second front" is a matter of immediate concern – it has unusual significance.

" . . . the greatest need has been, and still is," Gen. Somervell emphasizes, "for a more comprehensive program of equipment standardization and simplification."

★ ★ ★ ★

WHEN Hitler put this war on wheels he ran it straight down our alley. When he hitched his chariot to an internal combustion engine he opened up a new battle front . . . a front that we know well. It's called Detroit.

When Hitler took this war into the skies he rose into our own element. We'll meet him there on even terms. We're meeting him there already. From Brest to Berlin he feels our strength, and as the days of summer lengthen he'll feel it again and yet again without respite.

When one asks what the SAE can do to help the Army – and before an outline of future programs for cooperative effort by the SAE and the Army is presented – it is desirable that we review briefly "What the SAE has done in the past to help the Army."

Of course, such a review must include as its first item more than passing mention of the assistance which was rendered in World War I, during 1917 and 1918. Of special importance in that period was the contribution by the SAE to the original design, development, and production of the famous Class "B" or "Liberty" truck, which was carried through with hitherto unprecedented speed. Then immediately following World War I came the formation of the SAE Ordnance Advisory Committee, which ever since has collaborated with the Ordnance Department on mechanized equipment problems. The Aeronautical Division of the Society's Standards Committee, active for many years, has contributed intensively in the past two years to the standardization so necessary in aircraft engines, propellers, accessories, and materials. Similarly, the assistance rendered to the Quartermaster Corps by the SAE Quartermaster Corps Advisory Committee in determining applicable standards attainable in the general purpose motor-vehicle field has been invaluable, in the development of the Army truck program – and the work of the SAE War Engineering Board on critical materials and general technical advice has already been of great help to both the Quartermaster Corps and Ordnance Department.

Another service rendered by the Society which has permitted the Army to augment its technical staff with the services of trained engineers in a number of critical positions, is the personnel placement service. It is gratifying to the Army to recognize the generally high caliber of the men who have joined our ranks in professional or consultant capacities through the medium of this SAE service.

With this background of service rendered in mind, let us examine briefly some of the problems resulting from the rapid expansion of the Army's supply program objectives, the ideal equipment program, and the role of the automotive engineer in the attainment of that simplifica-

tion and standardization of equipment which is so essential to successful operation and maintenance. The work of the engineer as an individual, even when basically sound, can always be improved by that loyal opposition represented by fellow engineers with a different approach to any given problem. The value of group effort in the solution of engineering problems lies in this very fact. Coupled with a clear realization of the need for cooperative work, such a medium for the interchange of information and the formulation of decisions by the best talent available in its particular field exists in SAE membership.

The rapid expansion program of the Army in which we are currently engaged calls for unprecedented speed in revolving many problems in the various fields of general and specialized engineering represented in the SAE membership. Primarily, from a pure engineering viewpoint, the greatest need has been, and still is, for a more comprehensive program of equipment standardization and simplification. Warfare of today is extremely complicated in all its aspects, especially with respect to the variety of mechanized equipment which is needed.

■ Needs Maximum Interchangeability

It is obvious that the utmost simplicity and the maximum attainable interchangeability of these components and parts, not only on identical assemblies, but also as between different similar types, will afford some relief from the increasing complexity of the supply program. If one size of a bolt and nut combination can be eliminated from our supply lists, the job of furnishing one hundred per cent of the Army's requirements is just that much simpler. If all internal combustion engines could be so designed that only one type and grade of fuel would be needed in the field, one of our sensitive problems of supply would be materially reduced in scope.

The ideal program of automotive equipment would be one in which only a very restricted variety of components, such as engines, clutches, transmissions, gear boxes, axles, and final drive mechanisms, is used to provide the several different types of mechanized vehicles required by the Army to fulfill its combat mission and perform the attendant supply and housekeeping functions. For instance, if a single design of engine could be provided in a given size which could be used universally and interchangeably in a tank, a heavy truck, an assault boat, and a power-generating set, the training of personnel, the maintenance methods, and the spare parts supply problem would be simplified to an Utopian degree.

If the same principle could be applied to the other components of our mechanical equipment, it would be possible, by the comparatively simple expedient of different assembly relationships or arrangement of the standard items, to build almost any kind of a vehicle, tank, or self-propelled mount with a minimum variety of components. The principles of simplicity and standardization are equally as applicable to automotive equipment as they are to items of weapons and ammunition. An assured supply of calibre 30-30 cartridges to a rifleman equipped with the Springfield calibre 30-06 rifle is as useless as a warehouse full of 18 mm spark plugs would be to a mechanic who needs just one 14 mm plug to service his captain's command car.

Of course, this ideal is always most impossible of attainment. It is especially difficult to bring about in the automotive field because of the complexity of the commercial relationships, tooling availability, etc., on which our production must depend. Much progress has been attained in the direction of the ideal, however, and *it is a foregone conclusion that further improvement can, and must be secured. The barriers of commercial interest must be broken down completely in the greater national interest of providing automotive equipment which will do the work required of it with the simplest possible system of supply and maintenance to keep it rolling.*

One of the outstanding features of our present wartime production program is the degree to which non-essential manufacture has been and is being converted to the fabrication of items entirely foreign to ordinary peacetime commerce. This plant conversion calls for adequate engineering planning and in many instances this very fact has resulted in the development of new and more efficient methods of fabrication than were heretofore available. To these improved processes, the SAE has contributed much.

As you know, the situation with respect to certain critical raw materials is very serious. The use of substitute materials of a less critical nature must be developed on the basis of sound engineering advice. For nearly a half-century the trend has been toward greater efficiency of machines, based largely on the generous use of some of these materials which are today the most difficult to secure. In this war effort, engineering must actually go into reverse, so to speak, and in many cases adapt modern manufacturing processes and standards to materials which have been superseded for years by the more efficient, but now unobtainable alloys. These problems of substitute materials must be attacked with a full knowledge of the sacrifices in strength, resistance to fatigue, weight, dimensions, and similar characteristics, which must be made in order to conserve the critical items for use where – and only where – research fails to disclose a possible alternate in either materials or design.

■ SAE Effort Must Continue

There is no question as to the way in which the SAE can help the Army. The Society can and must continue every service which it is rendering at present through the various agencies functioning under its correlating SAE War Activities Council.

It can act as a liaison agency on behalf of the government in the development of factual data, reports and recommendations from the automotive engineering talent of the industry on problems which arise from time to time. By the selection of group representatives with specialized knowledge and experience, it can aid in securing the quick action which describes modern warfare and the concentration of proved ability or the solution of specific engineering problems. Since the SAE is purely an engineers' group, its approach to problems can and should be made without any tinge of that commercialism which now must be thrust aside in our common cause.

The SAE has rendered real service to the Army. There still remains plenty to do, and the SAE is the one agency in the automotive field which can furnish to the Army's engineering and production officials that guidance along its specialized lines which will result in translating the automotive industry's slogan: "When better cars are built, America will build them" into the victory by-line: "We beat them with better equipment."

Standard SAE-ASTM Classification and Tests Recommended for Natural Automotive Rubbers

THE accompanying classification and test requirements for natural rubber stocks are recommended for use in automotive and general mechanical applications other than tires, for absorbing noise or vibration, or where resiliency is desired. They were derived from the data available in both the rubber and mechanical industries and represent a careful selection from several hundred stocks that have been in use. The classification also provides uniformity in testing, according to ASTM methods, that was lacking previously. It was submitted to the SAE General Standards Committee on June 5, for approval.

The classification was prepared by Subcommittee V on Rubber Conservation as a part of the general program of SAE-ASTM Technical Committee A on Automotive Rubber, that includes classifications of stocks, standard methods for testing, and instrumentation. W. J. McCortney and J. C. Dudley, both of Chrysler Corp., are chairman and secretary, respectively, of Subcommittee V. Other standards for rubber products such as engine mounts and hose have already been adopted and are published in Section 4 of the SAE Handbook.

The classification was adopted as a means of conserving natural rubber stocks. It is subject to such revisions periodically as may be considered necessary with further developments in the materials and experience in their production and uses.

Standard recommended SAE-ASTM specifications for synthetic rubbers, developed by Subcommittee V of the SAE-ASTM Technical Committee A on Automotive Rubber, were published on pp. 20-22 of the June, 1942 SAE Journal.

Proposed Classification of Natural Rubber and Qualities for Automotive Use

As revised May 19, 1942—Proposal No. 3.

Classification Number	Hardness ASTM D-314-39	Minimum Tensile Strength, psi ASTM D-412-41	Minimum Elongation, %	20% Load Deflection, psi ASTM D-575-40T	Hardness Shore Durometer Approximate
R300B	150 ± 20	....	....	.....	30
R309	150 ± 20	900	500	.....	30
R315	150 ± 20	1500	600	70 ± 10	30
R320	150 ± 20	2000	600	70 ± 10	30
R330	150 ± 20	3000	700	70 ± 10	30
R400B	105 ± 15	....	....	.....	40
R405	105 ± 15	500	300	.....	40
R409	105 ± 15	900	500	.....	40
R415	105 ± 15	1500	500	100 ± 15	40
R420	105 ± 15	2000	500	100 ± 15	40
R430	105 ± 15	3000	600	100 ± 15	40
R500B	75 ± 10	....	....	.....	50
R506	75 ± 10	600	300	.....	50
R509	75 ± 10	900	300	.....	50
R515	75 ± 10	1500	400	140 ± 20	50
R525	75 ± 10	2500	500	140 ± 20	50
R535	75 ± 10	3500	600	140 ± 20	50
R600B	55 ± 8	....	....	.....	60
R606	55 ± 8	600	300	.....	60
R609	55 ± 8	900	300	.....	60
R615	55 ± 8	1500	350	195 ± 30	60
R620	55 ± 8	2000	400	195 ± 30	60
R625	55 ± 8	2500	450	195 ± 30	60
R635	55 ± 8	3500	550	195 ± 30	60
R700B	40 ± 7	....	....	.....	70
R703	40 ± 7	300	100	.....	70
R704	40 ± 7	400	150	.....	70
R706	40 ± 7	600	200	.....	70
R709	40 ± 7	900	250	.....	70
R715	40 ± 7	1500	300	285 ± 50	70
R720	40 ± 7	2000	350	285 ± 50	70
R730	40 ± 7	3000	450	285 ± 50	70
R804	28 ± 7	400	100	.....	80
R806	28 ± 7	600	150	.....	80
R809	28 ± 7	900	200	.....	80
R812	28 ± 7	1200	250	.....	80
R820	28 ± 7	2000	250	450 ± 75	80
R825	28 ± 7	2500	300	450 ± 75	80
R907	13 ± 7	700	75	.....	90
R915	13 ± 7	1500	200	.....	90

Explanation of Proposed Rubber Properties Chart

As revised May 19, 1942—Proposal No. 3.

Prefix Letter "R" of Classification Number Indicates "Rubber."

Use

Suffix letter *A** indicates general-purpose rubber compounds for which compression set or special aging is not required or designated.

Suffix letter *B** indicates rubber compounds with maximum compression set requirements.

Suffix letter *C** indicates rubber compounds adapted for outdoor aging.

Physical properties specified in the chart are based on test specimens having an equivalent cure of the part in question rather than the optimum cure and the physical properties of the part correlated with the test specimens.

Hardness

First digit of Classification Number indicates the approximate Durometer hardness.

Hardness specified shall be determined by ASTM test method D-314-39.

Tensile Strength

Second and third digits of Classification Number indicate minimum strength.

Tensile and elongation specified shall be determined by ASTM test method D-412-41.

Load Deflection

Load deflection specified shall be determined by ASTM test method D-575-40T.

Compression Set

On Compounds R300 B, R400 B, R500 B, R600 B and R700 B, the compression set shall not exceed 25%. When *B* designation is used on any other compound, the compression set shall not exceed 50%.

Attention is called to the new ASTM test method D-395-40T (Method B) which is based on compressed thickness of specimen rather than the original thickness. Maximum compression set specified shall be determined by the new method.

Research is in progress on the use of other limits of time and temperature. As a reference check ASTM test procedure D-395-40T method B may be extended to 70 hr with comparable limits of compression set.

Aging

Tensile and elongation deteriorations shall not exceed 15% of original values of any compounds after 72 hr at 158 F as per ASTM test method D-573-41, accelerated aging.

Color

Color is not specified in any of the above classifications, but should be black whenever possible and without bloom that may have an adverse effect on the aging of the compound.

* These suffix letters may be used singly or in combination, as applying to any of the rubber stocks listed in the classification, depending upon requirements.

Facing the Supreme Challenge

by JOSEPH B. EASTMAN
Director, Office of Defense Transportation

★ ★ ★

THE Office of Defense Transportation was created to safeguard the future. At the time of the last World War the railroads had the transportation field very much to themselves, and they got into serious trouble. There were all manner of traffic blocks, tie-ups, shortages, delays and congestion. To cure these troubles the Federal Government found it necessary to take the railroads over and operate them as a unit through the United States Railroad Administration.

The situation today is very different. The railroads are still the country's biggest factor in freight transportation, but other transportation agencies share the field to a far greater extent than they did in 1917. The principal change is the vast automotive transportation system. Water carriers, pipe lines, and the air carriers are also carrying a huge part of the load. Furthermore, when the present emergency loomed in 1939 the railroads were much better organized to meet it than they had been 22 years before. The Army, Navy and other large government shippers were better prepared for the emergency, and other types of carriers had been equally alert and active. As a result, traffic has thus far been handled splendidly. There have been few shortages or delays – and little congestion.

But since Pearl Harbor, the load has increased tremendously. The whole automotive manufacturing industry, and most of the durable goods industries of the nation have been retooled into a vast arsenal, producing more tons of arms, armored vehicles, tanks, aircraft, ships, and ammunition than they ever produced of peacetime goods. And every week new tools are being set up, new factory additions are being opened, and more plants are being dedicated. Every week new production records are being set by automotive and other manufacturers. This means that more ore, coal, coke, and other raw materials must be shipped to steel mills, that more tonnage must be shipped out to fabricators, to factories, to subcontractors and sub-subcontractors, more back to the assembly line, and more tons of the finished armaments to Army and Navy depots, and then a huge tonnage to our soldiers and allies overseas for winning this war.

But this is only one measure of the problem. There is no longer any intercoastal and very little coastwise shipping, and the burden of the traffic which these ships formerly carried has fallen on the railroads. And with the rubber shortage, the railroads are also faced with the prospect that they will have to carry a continually increasing share of the great traffic which has been handled by the highway automotive vehicles. Moreover, in view of the great demands on steel and other critical materials to meet military needs, the railroads, the pipe lines, and the inland waterway carriers can count on little new equipment, and there will be no abundance of materials even for maintenance purposes.

One of the great resources of our country, however, is engineering genius. Even the man in the street knows that this is a war of machines of most intricate and highly specialized construction. It cannot be won

[This paper was scheduled for presentation at the 1942 Semi-Annual Meeting of the Society, which was ruled out because of transportation priorities.]

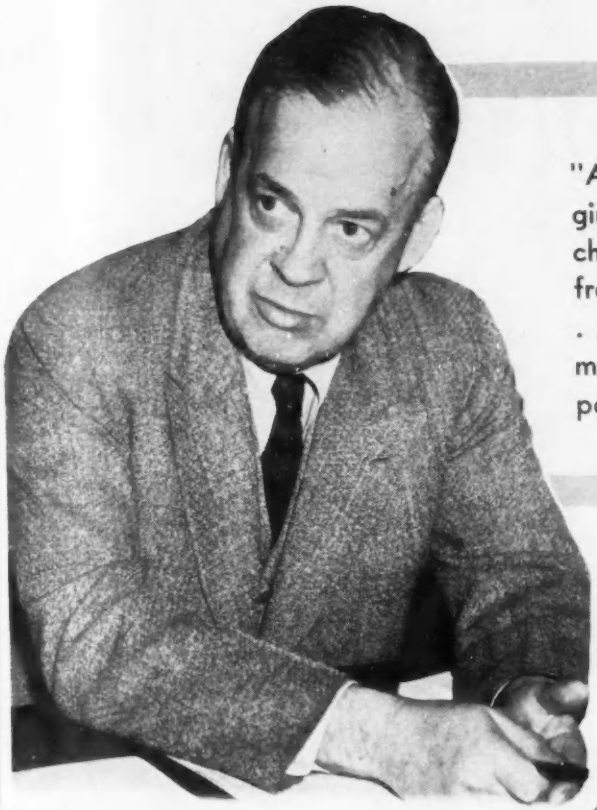


Photo by Press Association, Inc.

Joseph B. Eastman

"Automotive transportation engineers today face the supreme challenge . . . They must keep freight and passengers moving . . . And they must keep *more* moving with less equipment, parts and tires."

without the continued help of all the automotive, aeronautical, mechanical, chemical, civil, and every other variety of engineers. Among the great engineering achievements the nation boasts is the coast-to-coast system of highway transportation. Automotive transportation engineers have a right to be proud. But today they face the supreme challenge. They must do everything they can to keep freight and passengers moving – and they must keep them moving with less equipment, parts, and tires.

Some entertain the idea that a shortage of transportation is something that the country can endure – like a shortage of sugar – without harm to our war effort. It would not be long before a shortage in passenger facilities would affect adversely the vital movements of troops and defense workers, because of the great and continually increasing volume of such movements. And when it comes to freight, most of today's freight is arms and materials to build into armament and ships – or food and necessary civilian supplies for ourselves and our allies. There is very little "luxury" freight being hauled today, and there is going to be less and less as this war continues.

Contrary to a rather common impression, I am not a second McAdoo nor yet a transportation czar. Nevertheless, I have a very heavy responsibility for the transportation of our country in this time of war, and it is a responsibility which has been placed upon me by our President and Commander-in-Chief. If anything goes wrong with domestic transportation, at least so far as the successful prosecution of the war is concerned, I shall be held to account, and properly so. But I shall not be alone in this responsibility. Other Federal and State agencies who deal with transportation will share it, and responsibility will rest also on the owners of motor vehicles, railroads, and other transportation agencies. This responsibility in turn rests heavily with automotive transportation engineers who have solved tough operating problems, but who have never faced a challenge of today's proportions.

There is, in fact, another party of great influence, and that is the public which all carriers serve. One of the biggest factors in the excellent record thus far made in this emergency has been the fine help the carriers have received from the shippers. The spirit of the shippers has become little short of evangelistic, and it reflects the spirit of the citizenry generally. The offers of help and cooperation which I have received since my appointment have been extraordinary both in scope and in number.

We can't have too much of this cooperation. Trucks must be loaded to practical maximums if they are going to do their utmost in winning the war, and wasteful operations must cease. This means that shippers must be will-

ing to make real sacrifices in respect to dates of deliveries – except for materials and products needed for winning the war. Trucks must be maintained with more rigid care than ever before, and this in the face of the shortage of mechanics called to the armed forces. Many maintenance routines must be junked completely, and others must be reorganized to take advantage of skilled manpower in the shops. Night repairs must carry some of the load of day repairs, and this despite possible dim-outs and blackouts.

These, and many other problems are for transportation engineers to solve, just as they have been solving vehicle operating problems for years, both as individual engineers and as members of the Society of Automotive Engineers. The splendid record of cooperation through numerous engineering projects of your Society sets the background for the challenge thrust upon your members by total war.

The basic principle of the Office of Defense Transportation, as I see it, is not to drive the carriers with whip and spur, but to lend them the help and authority of the government in the conduct of their affairs for the prime purpose, as stated in the opening words of the Executive Order, of assuring "maximum utilization of the domestic transportation facilities of the Nation for the successful prosecution of the war." The automotive and other carriers are given the opportunity, with this potent aid, of achieving this essential result under, so to speak, their own power with their own management in immediate command. At the same time, as Director of the Office of Defense Transportation, I have been given the duty of close surveillance of what they do, of developing plans to safeguard the future, of stimulating and promoting action along all necessary lines, of undertaking to assure the carriers the tools and materials which will enable them to do their part, of actually directing traffic movements if need be, and finally of keeping close watch over the situation, so that I may be in a position without delay, to recommend to the President, or to the President and Congress, any further action that may be necessary.

SAE Aircraft Engine Standards Committees Report Progress

RAPID progress has been reported by chairmen of the SAE Aircraft-Engine Subdivision on the wide front of standardization of component parts for the fighting aircraft for the United States and her allies.

Several of the 15 engine committees have taken on additional assignments to round out their original programs. All have made careful studies of current design and manufacturing practices for the purpose of analyzing pertinent points.

Preservation of Engines

Projects approved by the Preservation of Engines Committee (E-9), under the chairmanship of A. P. Ayers, Pratt & Whitney Aircraft, include:

- Procedure for Preparation for Storage of Aircraft Engines (AMS-2570) which is a revision of the Aeronautical Standard on this subject (AS-5, March 1).

The following standards involved in the procedure of preserving aircraft engines have been issued, but will be revised at periodic intervals in the light of additional experience, such as required:

- Moisture-Resistant Transparent Envelope (AS-6),
- Cylinder Dehydrator Plug (AS-7),
- Crankcase Dehydrator Plug (AS-8),
- Spark Plug Terminal Protector and Cable Attachment (AS-9),
- Humidity Indicator (AS-10),
- Corrosion Preventive Compound Spray Equipment (AS-11), and
- Corrosion Preventive Carburetor Slushing Oil (AMS-3070).

Other approved SAE standards in this group are:

- Corrosion-Preventive Compound for Aircraft Engines (AMS-3072),
- Moisture-Resistant Transparent Plastic Film (AMS-3610), and
- Silica Gel Dehydrating Agent (AMS-3420).

Proposed standards of recommended practices on the following items are being developed by the committee:

- Slushing and packaging of Spare Parts,
- Specifications for Slushing and Packing Materials, light oil and grease types,
- Specifications for Adhesive Tape for Sealing Envelopes,
- Acid-free and Moisture-repellent Wrapping Paper, and
- Containers for Engine Parts.

Another proposed aeronautical standard developed by the Committee is awaiting further comments from the manufacturers of small engines. This is titled Preparation of Small Aircraft Engines for Storage (AS-4) into which has gone a great deal of basic study and research.

Throughout the work all applicable AN Specifications have been carefully coordinated, and the Engine Technical Committee of the Aeronautical Chamber of Commerce has been kept informed of developments. Furthermore, industry-wide surveys have been made to collect all available service data on this subject, both in this country and abroad. Lt.-Com. A. B. Scoles, of the Naval Aircraft Factory, and Capt. W. L. Hardy have also attended practically all meetings of the committee, thereby permitting a free and immediate exchange of all available information between the Army and Navy and the representatives of the industry.

Serving with Mr. Ayers are R. L. Heath, Allison Division, General Motors Corp.; B. L. Sharon, Lycoming Division, The Aviation Corp.; R. B. Stevenson, Davison Chemical Corp.; and M. H. Young, Wright Aeronautical Corp.

Engine Accessory Drives

The Committee headed by G. N. Cole, Pratt & Whitney Aircraft, on Engine Accessory Drives (E-2) has completed 3 aeronautica standards, and has in final stages of preparation 12 others. Five other projects are under way.

Approved standards of engine accessory drives are:

- Type I Propeller Shaft Ends (AS-41),
- Mounting Pad and Drive for Gun Mounts (AS-48),
- Type I Tachometer Drive (AS-54).

Among the proposed standards submitted to the Engine Subdivision for approval are:

- Mounting Pad and Drive for Propeller Governor (AS-43),
- Type I, II, III, and IV Mounting Pad and Drives for Starter (AS-44),
- Mounting Pad and Drive for Generator (AS-45),
- Mounting Pad and Drive for Fuel Pump (AS-47),
- Mounting Pad and Drive for Vacuum or Hydraulic Pump (Type I, AS-49; Type II, AS-50; and Type III, AS-51),
- Types I and II Mounting Pad and Drive for Power Take-Off (AS-53),
- Type II Mounting Pad and Drive for Tachometer (AS-55).

Standards projects in the final stage of development include:

- Propeller Shaft Ends Thread Protector Cap, Type I,
- Revision of Type I Propeller Shaft Ends (AS-41, above), and
- Type IIi Mounting Pad and Drive for 4-Bolt Generator.

Projects in preliminary stage of development include:

- Aircraft Accessory Index,
- Accessory Rotation Oil Seals.

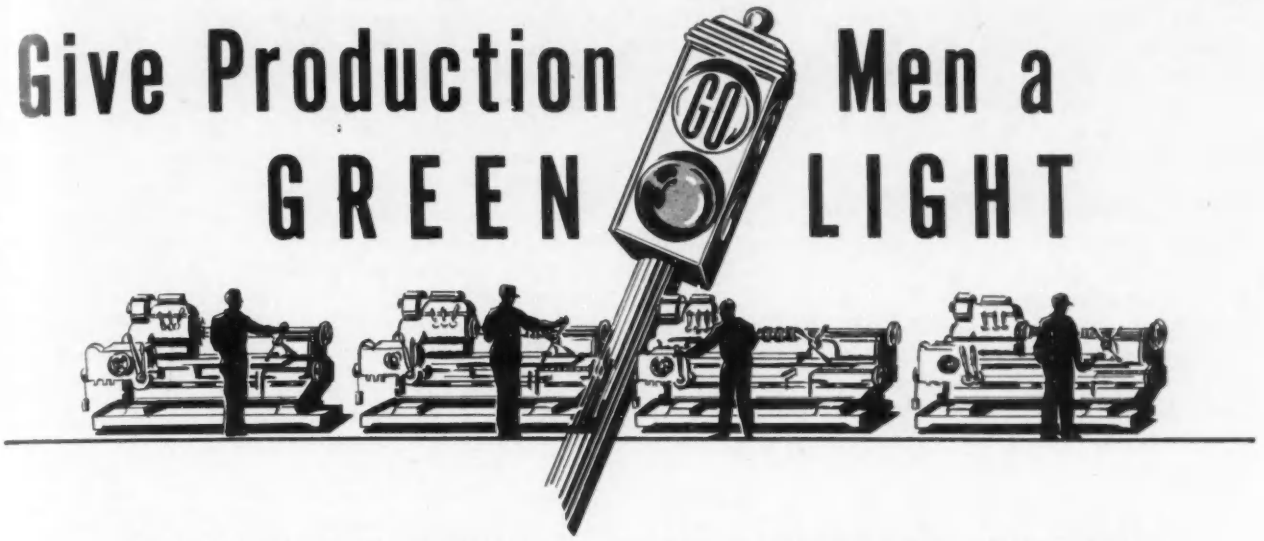
Other projects are:

- Standard Drives for Small Trainer Type Airplane Engines,
- Generator Drives for Small Trainer Type Airplane Engines, and a
- Study and comparison of AS-41, AS-48, and AS-54 with all applicable AN Specifications for the information of the Engine Technical Committee of the Aeronautical Chamber of Commerce of America.

Serving with Mr. Cole on Committee E-2 are Gustaf Carvelli, Wright Aeronautical Corp.; Walter Hurleman, Jacobs Aircraft Engine Co.; William Waddell, Lycoming Division, The Aviation Corp.; and C. J. McDowall, Allison Division, General Motors Corp. A photograph of this committee, taken at one of its recent meetings, appeared on p. 22, June SAE Journal.

(Watch the SAE Journal for future progress reports on aeronautical standards, recommended practices, and materials specifications.)

Give Production Men a GREEN LIGHT



by LT.-COM. J. D. MOONEY and LT.-COM. HARRISON F. ANDERSON

United States Naval Reserve

IT is a common European saying, that the genius of American civilization is expressed in business. Ever since the early days of the Republic, business has attracted the best of each generation of American youth. By "business," of course, is meant the entire field of commerce and industry, as distinguished from the classic professions of law, medicine, and the Church.

During the great period of growth and expansion in American industry, the producer of goods played the leading role in the great business drama. The man who made a better mousetrap might live in the depths of a forest, but the world would beat a path to his door.

But, many forces combined to depose the production man from his high place, in the first three decades of this century. For one thing, this was a period of enormous inventive activity; the motion picture, the automobile, the radio, electric refrigeration – all these and many other mechanical devices were invented, or perfected, and put into a highly competitive market to vie with each other for a share in the consumer's dollar. Moreover, many manufacturing concerns combined to do business on a national scale, with a resulting complexity in their distributive organizations. Salesmen and sales managers, advertising men and various promotion men, came to assume an ever-increasing importance.

■ Management Changes Character

Similarly, with the growing complexity of the business structure, men of finance – accountants, bankers, brokers – achieved a greater share in the direction of affairs.

And management changed its character entirely. In the 19th Century nearly every business was managed by its owner; but with the growth of the great corporations, ownership became widely diffused among thousands of shareholders, and professional management made its appearance.

For another thing, this period was one generation removed from the great immigration era. The newcomers to this country from Europe were anxious that their children should have a higher status in society than they themselves had enjoyed. And in their opinion, "white collar" work connoted an upward step on the social ladder.

■ Producers Needed

Finally, the public school system of the United States gradually came to consider that the highest unit of the educational organization – the university – should be the goal of every pupil. With this goal in mind, a very natural corollary presented itself: each pupil should strive to enter business as an executive, not as a producer.

The last two forces are the most important, though perhaps not the most effective, for they are sociological in their implication, while the others are simply economic. For many years the schools preached, and thousands of families believed that the professions and the administrative side of business called for a higher type of brain, of education, even of character, than the production side of business. Consider, for a moment, what such an opinion would do to a young man whose every aptitude drew him toward machines, shop crafts, engines, and tools. He accepted as truth the idea that he wasn't as bright or as worthy as many other types of men. Consider now, if you will, how this same prevalent opinion affected the rest of society – or at least, the rest of industry. All the other phases and branches of business came to consider the shop as a merely necessary, but dull and uninspired, scene of monotonous labor. And the shop – the productive soul of business, mind you – became relegated to a negligible sum, in the computation of worth of business. The whole viewpoint, in recent years, has been stupid economically, and

[This paper was scheduled for presentation at the 1942 Semi-Annual Meeting of the Society, which was ruled out because of transportation priorities.]

most undemocratic sociologically.

The fact is that a lifetime of shop work gives to a man skills and understanding, and a lively philosophy. Can as much be said for other phases of business? Another fact is that mechanics can – and often do – develop an excellent grasp of finance, of policy direction, of management problems in general, whereas the executives of business have proved incapable of developing either the skills or the philosophy of the shop.

■ Production Needs Close Study

These observations on recent trends in the evolution of our society are noted here because they have a bearing on the problem which now confronts the nation. It is a fact, a widely and commonly quoted fact, that production is the key to our victory in war as it has been to our success in peace. Would it not be worth while, then, to examine production rather closely, and assign to it the rightful place in our thinking, and in our general scheme of things?

First, let us consider the production set-up of our enemies, the Axis nations. They are at least five years ahead of us in their production schedules, and heaven alone knows how many years ahead of us in their underlying production philosophy. You will recall, perhaps, another instance of a European despotism turning to the west for guidance in a production problem: Peter the Great, Czar of all the Russias, left his country in disguise, journeyed to Holland, and worked as a laborer in the shipyards of Holland in order to teach his people the crafts of seafaring people. As a result of his enterprise, his people became a naval power among the western nations, using skills and techniques borrowed outright from the Dutch. So have the European and Oriental leaders of today studied our production methods in order to implement their own philosophy of war.

Now, there is no doubt in the minds of any of us that American soldiers and sailors, the American Army and Navy, are the peers of any on earth. But in these days of mechanized warfare, stout hearts and brilliant brains are not enough to win wars. It is not only inhumanly cruel to send American boys poorly armed against a well-equipped and ruthless enemy; it is incredibly stupid in a nation supreme in mechanical arts, and it is suicidal.

What, then, must be our procedure to secure the victory which is essential to our very lives? There is only one answer: We must convert our vaunted superiority in peaceful production to an equally superior deadliness in war gear. And to do that, production men must be given full responsibility, adequate authority, the green light, and a clear track.

SAE Aircraft Accessory Materials Committee Holds Important Meeting

SNAPPED IN A HOTEL NEW YORKER COMMITTEE ROOM, on May 22, were members of the SAE Aircraft Accessory Materials and Processes Committee, as the group continues its vital war work. Seated around the table (left to right) are: A. J. Volz, Bendix Products Carburetor Division, Bendix Aviation Corp.; R. R. Moore, Naval Aircraft Factory; B. Clements, Wright Aeronautical Corp.; H. D. Bubb, Jr., Thompson Products, Inc.; W. B. Leyda, A. O. Smith Corp.; N. E. Woldman (committee chairman), Eclipse Aviation Division, Bendix Aviation Corp.; J. D. Redding, SAE staff representative on aeronautical activities; J. B. Johnson, Materiel Center, U. S. Army Air Forces; C. E. Stryker, Aircraft Standard Coordination Unit, WPB; R. W. Waring, Sperry Gyroscope Co.; C. E. Carrigan, Ranger Aircraft Engines, Division of Ranger Aircraft Engine & Airplane Corp.; R. C. Pocock, Bendix Products Carburetor Division, Bendix Aviation Corp. Lt. S. D. Daniels, Working Committee, Aeronautical Board, was out of the room at the time the picture was taken.

SAE-ESD Aircraft War Production Meeting Draws Over 4000 Engineers

MORE than 4000 engineers attended the sessions and visited the great Ford exhibit of aircraft production parts which comprised the meeting on War Production of Aircraft, sponsored jointly by the SAE Detroit Section and the Engineering Society of Detroit, at the Rackham Educational Memorial Building on June 8. The SAE Aircraft and Aircraft-Engine Activity Committees co-operated.

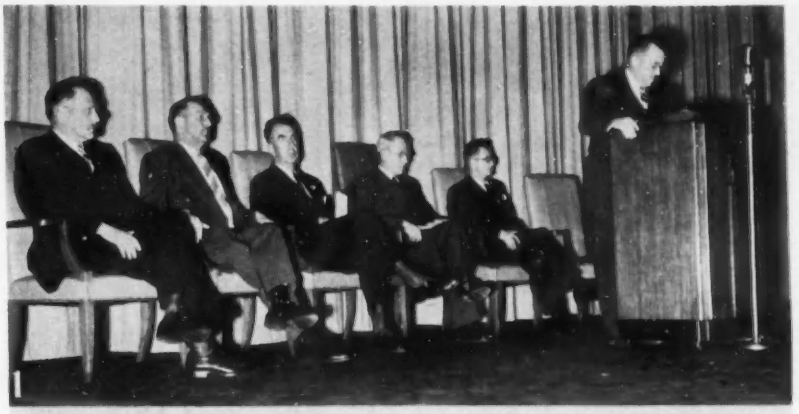
The program included three sessions – a morning, an afternoon, and an evening session – while the exhibit remained open during the entire day. In front of the building one of the huge truck-trailer units used for transporting bomber parts from the Ford Willow Run bomber plant to assembly plants also was exhibited. Two of these units are capable of transporting an entire bomber with the exception of the engines.

The morning session was presided over by S. K. Hoffman, Lycoming Division, The Aviation Corp. Two closely allied papers were presented by John Dolza and H. C. Karcher of the Allison Division, General Motors Corp., entitled, respectively, "Correlation of Ground and Altitude Flight Tests of Oil Systems" and "Oil Pumps and Their Operation at High Altitudes."

For the afternoon session a paper by W. G. Ovens, Wright Aeronautical Corp., on "Some Notes" on the Design Features of the Mitsubishi Kinsei Engine," was presented. The actual engine was on exhibition as a part of the Ford exhibit in the basement of the Rackham Building, and was so arranged that it could be examined carefully by those attending the various sessions. The chairman of this session was R. N. DuBois, Aircraft Division, Packard Motor Car Co.

The evening session was attended by members of both the SAE and ESD. Prior to the presentation of the main paper scheduled for this session, the members were welcomed by Harvey M. Merker, president of the ESD, who was introduced by SAE Past President Arthur Nutt, Wright Aeronautical Corp., and chairman of this session.

"In welcoming you to the meeting this evening," Mr. Merker said, "I recall that this is the first opportunity I have had to address a meeting of the Society of



1. The speakers platform at the evening session of the SAE-ESD meeting on War Production of Aircraft: (left to right) SAE Vice President representing Aircraft-Engine Activity Carl F. Bachle, Continental Aviation & Engineering Corp.; Harvey M. Merker, president, The Engineering Society of Detroit; SAE President Arthur W. Herrington, Marmon-Herrington Co.; SAE Past President Arthur Nutt, Wright Aeronautical Corp.; T. P. Wright, assistant chief, Aeronautical Branch, War Production Board; and Incoming SAE Detroit Section Chairman E. W. Austin, Timken Roller Bearing Co.

2. & 3. Guests of the SAE Detroit Section and The Engineering Society of Detroit at a special reception and dinner preceding the evening session included members of the National Inventors Council, automotive executives responsible for the industry's outstanding war production record, and officials of the two sponsoring groups

Across the head table (2) at this dinner were: SAE Vice President Carl F. Bachle; SAE Vice President Peter Altman; SAE President Arthur W. Herrington; SAE Past President Arthur Nutt; T. P. Wright, WPB; Incoming Detroit Section Chairman E. W. Austin; and ESD President Harvey M. Merker

At another part of the table (3) were: Com. H. L. Phelps; K. T. Keller, president, Chrysler Corp.; Rear-Admiral H. G. Bowen; Com. John O. Huse; and E. V. Rippingille, Research Laboratories Division, General Motors Corp.

Automotive Engineers and The Engineering Society of Detroit, since the dedication of this (Rackham) memorial building some months ago. This building is a tribute to the engineering profession. So also is the meeting and exhibit you have attended today. They exemplify the position engineering has attained here in Detroit and what the profession is doing under present wartime conditions. They are truly an inspiration to all of us."

Following the address of welcome, E. W. Austin, incoming SAE Detroit Section chairman, remarked upon the activities of the SAE in the war.

Austin Welcomes Group

"The SAE was 'in line' long before Pearl Harbor," Mr. Austin said. "It has been cooperating with the Army and Navy for many years. The work of its various committees is well known to everyone. The work of its members on the National Inventors Council is also familiar to many of us. It is through work of this kind that the best efforts of the Society are made evident. I sincerely urge all of you to engage in committee work for the good it will do you as well as the Society." Members of the National Inventors Council were guests of the SAE at this meeting.

Introducing those seated on the speakers' platform, Mr. Nutt paid tribute to the work done by SAE Vice Presidents Carl F. Bachle and Peter Altman, commenting especially on their Society activities.

President Herrington Speaks

SAE President Arthur W. Herrington, in a brief talk, summarized his reactions to the conditions he experienced abroad during his recent trip to the Far East as a member of the Louis Johnson mission. He expressed his thanks to SAE Past Presidents A. T. Colwell and Arthur Nutt, and to SAE General Manager John A. C. Warner for so kindly "pinch hitting" for him during his two months' absence.

Commenting upon his visit and experiences in the embattled lands outside the United States during the past few months, Mr. Herrington expressed the wish that every member in attendance at the meeting could have had the same experience. "It would give us a fuller appreciation of that which we possess and of the land in which we live," he said. "The biggest surprise to greet me on my return was the wave of optimism which seems to be sweeping our country at this time. . . . The hope that this war can end this year is not based upon observable fact.

"The most hopeful thing which I find upon arrival, is that the President of the United States and his immediate advisers are so fully abreast of the situation before us that they certainly have no illusions concerning it." Mr. Herrington then called attention to several recent news articles commenting upon the present war situation.

"Our nation is approaching its destiny," he said. "We are fated to be the leaders of the new world. The time has come for us to assume this leadership, and our hope and prayer must be that we are worthy of it. . . . There can be no peace hereafter unless we now recognize that the principle of empire and the economic exploitation of the rights of peoples must be brought to an end. We will fail in this leadership unless we proclaim to all that the system which we envisage after the war will abolish for all time any discrimination between people because of their race, creed, or color. . . .

"Many of our long cherished institutions must go in order to make room for this new conception of existence among the world's family of nations. There will be many protests from those who fancy that their individual selfish interests are being injured. The eventual hope of the establishment of a permanent peace rests entirely with our ability to submerge our own selfish interests to those of the world's common good. Truly this is our day of destiny."

Mr. Herrington then concluded by telling Somerset Maugham's story of the merchant of Baghdad in which the merchant's servant seeks to avoid death by running away from it, only to meet it in a far off city.

T. P. Wright Tells WPB Program

Following Mr. Herrington on the program, the speaker of the evening, T. P. Wright, assistant chief, Aircraft Branch of the War Production Board, spoke on "The War Production Effort in Aircraft." He said in part:

"Two factors in any war effort are the physical or material and the psychological – the latter involving a determined mental attitude – morale. Morale is a state of mind especially of a whole people who are determined to accomplish the necessary task. We must have the necessary mental attitude and must reconcile ourselves to an ever increasing amount of sacrifice, blaming our common enemies for this disruption, not the more visible causes, such as high taxes, rationing, petty injustices, and the like. We still have some distance to go in acquiring a proper mental attitude toward our job."

Referring to the material side of the war effort, Mr. Wright stated that, in so far as expense is concerned, the ratio of the cost of mechanized equipment for armies is in the ratio of five to one, com-

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"The Manly Engine"

A SPECIAL committee under the chairmanship of Neil MacCoull, appointed by the SAE Council, has just completed the editing and publication of "The Manly Engine" – a booklet commemorating important contributions of the late Charles M. Manly in the early days of aircraft-engine development. Mr. Manly was president of the Society in 1919.

This booklet reprints from one of the publications of the Smithsonian Institution,* now out of print, a fairly complete account of the inspiring pioneer work done by our past president, Charles M. Manly, in developing an airplane engine which may be considered the ancestor of all modern radial engines. The great number of young engineers who have recently entered the aviation field will find it inspiring to read in Mr. Manly's own words the almost insurmountable difficulties he experienced less than 50 years ago, in securing even the materials to build his engine. He had to import alloy steel from France to make his own ball bearings, high tension cable, and even his own spark plugs. In fact, Mr. Manly only consented to build this engine after it had been found that engine builders in America could not build the desired 12 hp engine, weighing under 8 lb per hp, and the great European engine builders such as Daimler, said an engine of this type was an impossibility.

In spite of such discouraging advice and many other difficulties, unbelievable in our day, Mr. Manly succeeded in building an engine which developed 52.4 average hp for 10 hr, and weighed less than 3 lb per hp. This performance was not exceeded until the advent of the Liberty engine, 17 years later.

This was the first engine in which such innovations were incorporated as a high tension distributor, master connecting rod, etc.

This engine is of particular interest today because it was financed with government money, as a part of a program of the War Department to develop an airplane for military purposes. President McKinley was farsighted enough to secure a grant of $50,000 from Congress to develop a complete airplane and engine!

It is the expressed desire of the special committee responsible for publication, that this booklet should eventually be available in every library and institution where those interested in aviation and internal combustion engines may have access to it. A particular point has been made to include only the most interesting material, thus resulting in a booklet of only 56 reading pages, so that any busy engineer or student will be able to find time to read it.

Copies of the book, nicely bound in cloth, may be obtained by writing to SAE Headquarters. Price $1.50 per copy.

* From "The Langley Memoir on Mechanical Flight," 1911.

About SAE Members

E. C. **De SMET,** formerly chief body engineer at Willys-Overland Motors, Inc., has now been appointed chief engineer of the newly-formed Aircraft Division of the company, in charge of all engineering in connection with certain subcontracting work undertaken by this company.

Chief engineer of the Bristol Aeroplane Co., Ltd., Bristol, England, **SIR ALFRED HUBERT ROY FEDDEN** was elevated to knighthood by King George. He was one of the men honored for services to his country. He has been an SAE member for 15 years.

Roy H. Faulkner

Former automobile executive in new post

ROY H. FAULKNER, formerly president of the Auburn Automobile Co., and of the Pierce-Arrow Sales Co., has been appointed executive vice president of General Broadcasting System, Inc., and its affiliates, Motion Picture Productions, Inc., and Emerson Corp. His headquarters will be in Cleveland.

WILLIAM H. SPENCER is acting section chief of the Molybdenum Section, Tungsten Branch, Materials Division, War Production Board, Washington. Prior to joining WPB, he was manager of the Foundry Division of the Wilkening Mfg. Co., Philadelphia.

JOHN J. WRENN recently joined the sales engineering department of SKF Industries, Inc., Philadelphia. Previously he was a special representative in the National Accounts Division of the Studebaker Sales Corp. of America, New York City. He is vice chairman, Passenger Car Activity, Metropolitan Section.

FREDERIC SALTZMANN, formerly chief engineer, Clayton & Lambert Mfg. Co., Detroit, is now with the Die Typing Corp., Detroit, in the same capacity.

Formerly aeronautical engineer in the Junior Executive Engineering Department of the Ryan Aeronautical Co., Lindbergh Field, San Diego, Calif., **WILLIAM F. BUNSEN** has been transferred to the position of powerplant engineer with the same company.

HENRY A. MOREAU has left his position of superintendent of operations, National Airlines, Inc., Jacksonville, Fla., and has joined Alaskan Star Airlines, Anchorage, Alaska, as operations manager.

H. R. SUTPHEN has been named executive vice president of the Electric Boat Co., Groton, Conn. He was previously vice president of the same company, headquartered in New York City, and for more than 20 years has been president of the National Association of Engine & Boat Manufacturers.

JOHN W. SANDS, formerly in charge of the New York Field Office, development and research division, International Nickel Co., Inc., is now consultant for the Bureau of Industrial Conservation, War Production Board, Washington.

A. M. NEY has gone from Pratt & Whitney Aircraft Division, United Aircraft Corp., East Hartford, Conn., where he was design engineer, to Ranger Aircraft Engines, Division of Fairchild Engine & Airplane Corp., Farmingdale, L. I., N. Y., as test engineer.

JAMES C. M. YOU is an engineer of defense transportation in the Office of Defense Transportation, Interstate Commerce Commission, Washington.

RICHARD C. LONG has assumed the position of Eastern sales representative, Warner Electric Brake Mfg. Co., South Beloit, Wis. He was formerly vice president of Wheels, Incorporated, New York City.

J. A. POREMBA, Thompson Products, Inc., Cleveland, has been advanced from development engineer to factory supervisor.

Sterling Vice President

Hans Bohuslav

HANS BOHUSLAV, formerly vice president in charge of engineering, Enterprise Engine & Foundry Co., San Francisco, is now with the Sterling Engine Co., Buffalo, N. Y., in the same capacity.

CLINTON RECTOR is no longer with the Bakelite Corp., New York City, where he was sales engineer. He is chief of the Synthetic Resins Unit, War Production Board, Washington.

FRANK M. RULE, National Bronze & Aluminum Foundry Co., Cleveland, has been promoted from sales engineer to manager of the specialties division.

Consultant to ODT

Fernand DeGueldre photo

W. E. Conway

Assigned to the Washington, D. C., office of Studebaker Corp. several months ago, **WILLIAM E. CONWAY** has been appointed a consultant to the Office of Defense Transportation. Mr. Conway, for several years a member of the Metropolitan Section governing board, has been associated with the Washington office of the company several times, his service there totaling more than 12 years.

Transfer to Washington of **K. D. SMITH,** assistant to the vice president, The B. F. Goodrich Co., Akron, Ohio, recently took place.

JULIAN CHASE, directing editor, Chilton Publications; **REX WADMAN,** editor, *Diesel Progress;* and **NORMAN G. SHIDLE,** executive editor, SAE Journal, have been named members of a 7-man committee to advise with the Board of Economic Warfare in regard to the licensing of published technical data leaving the country.

N. ERSHOV is no longer with the Amtorg Trading Corp., New York City, where he was an engineer in the technical division. He is now connected with the Soviet Government Purchasing Commission in Washington as representative of the Purchasing Commission in New York.

CHARLES H. WIDMAN has retired from active duty as vice president in charge of sales of the Murray Corp. of America, Detroit.

Imperial Oil Ltd., Toronto, Ont., recently announced the transfer of **W. T. A. BELL** to the position of Division manager at Montreal. Previously he had been sales manager of the British Columbia Division, Vancouver, B. C.

PAUL de KUZMIK, who had been maintenance engineer, Panair do Brasil, S. A., Subsidiary of Pan American Airways System, Rio de Janeiro, Brazil, is now in the engineering department of Pan American Airways, New York City.

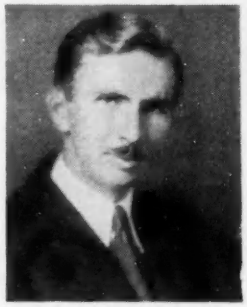
Formerly associate aircraft inspector, Department of Commerce, Civil Aeronautics Administration, La Guardia Field, N. Y., **FREDERICK W. ROHDE** is now chief inspector of Plant No. 2, at the Jacobs Aircraft Engine Co., Pottstown, Pa.

Formerly associate professor of psychology, Yale University, New Haven, Conn., **HARRY R. DeSILVA** has joined the Office of Price Administration, Washington, as head of research, planning and quotas, Automobile Rationing Section.

WILLIAM J. PERRY, formerly in charge of the Engine Inspection Unit, has been transferred to the Technical Control Branch, Tool and Gage Control Unit, Wright Field, Dayton.

A. L. STICA, formerly a designer at the Edward G. Budd Mfg. Co., Detroit, has joined the Multi-Engineering Co., Detroit.

Joins Fairchild



Richard C. Gazley

RICHARD C. GAZLEY has joined Fairchild Engine & Aircraft Co., Hagerstown, Md. He was formerly chief engineer in the Aircraft Division of the Murray Corp. of America, Detroit.

STEVEN E. BELSLEY resigned his position of engineer and aerodynamicist, North American Aviation, Inc., Inglewood, Calif., and joined the staff of the National Advisory Committee for Aeronautics, Ames Aeronautical Laboratory, Moffett Field, Calif., as assistant aeronautical engineer.

G. A. BEATTY has left the Pontiac Motor Division of General Motors Corp., Pontiac, Mich., where he was section head in the material analysis department, and is now in the engineering department of Eastern Aircraft Division, of General Motors Corp., Linden, N. J.

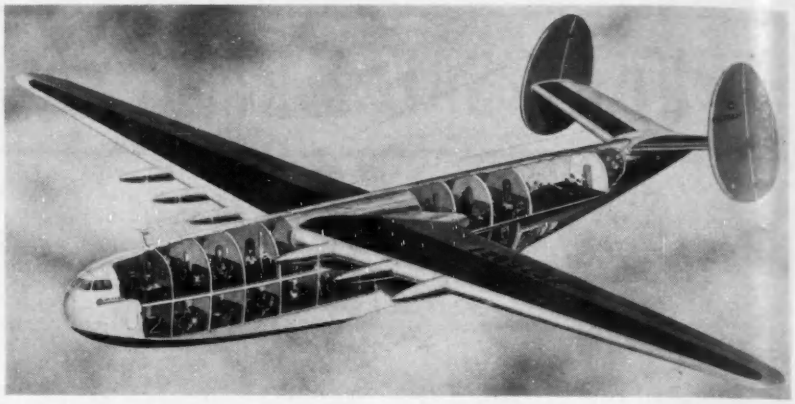
FRANK NIXON, who had been technical assistant to the chief engineer of Bristol Aeroplane Co., Ltd., Bristol, England, is now connected with the Powerplant Department, Rolls-Royce, Ltd., Derby, England.

Formerly a research engineer at the Shaler Co., Waupun, Wis., **DALTON RISLEY, JR.** recently became assistant to the president of Aircraft Rivet Corp., of the same city.

E. E. WACHSMUTH recently joined the Eastwood-Nealley Corp., Belleville, N. J., to do special research and development work.

Formerly representative and engineer for the McQuay-Norris Mfg. Co., of Canada, Ltd., Toronto, Ont., **WALTER G. CHANDLER** is now in charge of the engineering operations of J. Stuart McLerie, Ltd.

GEORGE W. NICOLETTI, formerly sales engineer, New England High Carbon Wire Co., Millbury, Mass., has been transferred by the company from Detroit to Washington to act as their representative for the duration.



SKY LEVIATHAN, a new design for a 250,000-lb flying boat. For this design and the 140,000-lb Mars, largest flying boat in the world now ready for tests, SAE Member Glenn L. Martin won the American Design Award (reported in June SAE Journal). The new ship will be able to carry 102 passengers, each with 80 lb of luggage, plus 25,000 lb of mail and cargo to London in 13 hr. As military transports, Mr. Martin said, such ships would be able to carry large numbers of troops and heavy equipment. As commercial vessels, for which the design was drawn, they would be able to rival, in a year of operation, the payload of surface ships

The Navy's colossus, Mars, could carry 150 armed men and their equipment, Mr. Martin said, if she were used as a transport. The interior of her hull is equivalent to the interior of a 15-room house

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J. V. CURTS is no longer mechanical engineer in the engineering department of the Ford Motor Co. of Canada, Ltd., Windsor, Ont. He is now connected with the John Inglis Co., Ltd., Toronto, Ont., as a mechanical engineer in the Ordnance Division.

HOWARD G. REED, former designer at Packard Motor Car Co., Detroit, is now chassis engineer, Willys-Overland Motors, Inc., Toledo.

LEWIS M. HORVATH, JR., is now a sales engineer with Adel Precision Products Corp., Burbank, Calif. He had been hydraulic engineer, Airplane Division, Ford Motor Co., Dearborn.

Named Advertising Director

H. L. Sharlock

H. L. SHARLOCK has been appointed director of advertising for Bendix Aviation Corp., Ernest R. Breech, recently-elected president, announced. He was formerly director of Public Relations at Bendix.

E. L. TIRRELL has left the City Hall Annex of the City of Philadelphia, where he was automotive engineer, and has become vice president of the Triple Cities Traction Corp., Binghamton, N. Y.

J. A. SCANLON, JR., has been promoted from junior to senior experimental test engineer, Wright Aeronautical Corp., Paterson, N. J.

ROBERT L. HARTLEY, formerly automotive engineer, automotive laboratory, Tide Water Associated Oil Co., Bayonne, N. J., recently joined the Fram Corp., East Providence, R. I.

WILLIAM R. CUBBINS, JR., who has been district manager, Trailer Co. of America, Long Island City, N. Y., is now senior production analyst, Quartermaster Motor Transport Service, Fort Wayne, Detroit.

TAGE HANSEN recently joined the staff of the Colonial-Beacon Oil Co., Boston, and at present he is working at the New England repair division shop, Everett, Mass., on the improvement and maintenance of engine-driven petroleum pumps. Previously Mr. Hansen was general manager of Brown & Moody, Inc., Cambridge, Mass.

HERBERT SCHEEL, former manager of the Used Car Department of Norman-Young, Inc., Dallas, is now with the Terrell Aviation School, Inc., R.A.F. Unit No. 1, British Flying Training School, Terrell, Tex., as instructor of engineering.

ALFRED H. FELDMANN has joined the staff of field and test engineers for tank and airplane engines of Continental Motors Corp., Detroit. Previously he was assistant to the research engineer, Briggs & Stratton Corp., Milwaukee, Wis.

P. C. LONG has resigned as superintendent at the Stinson Aircraft Division of Vultee Aircraft, Inc., Wayne, Mich., and has accepted a position with Intercontinent Aircraft Corp., Miami, Fla.

ERNEST L. FOSS is now a training coordinator at Owens-Corning Fiberglas Corp., Newark, Ohio. He was formerly administrator, Department of Public Relations, General Motors Corp., New York City.

Formerly a draftsman, Shell Oil Co., Inc., San Francisco, **MILLAR F. CLARKE** holds a similar position in the Iron & Steel Division of Henry J. Kaiser Co., Inc., Oakland, Calif.

JAMES **LYNAH** is now vice president and general manager of the Brunswick Marine Construction Co., Brunswick, Ga., manufacturers of ships. He was formerly director of physical education and athletics, Cornell University, Ithaca, N. Y.

W. E. **HORENBURGER,** assistant to the president, Excel Foundry & Machine Co., Inc., New York City, has been transferred to Fall River, Mass., where the engineering plant of the company will concentrate all of its torpedo production. He is handling subcontract work on this program. Mr. Horenburger has served on the SAE Metropolitan Section Governing Board.

HOWARD N. SILL is taking a graduate training course at Allis-Chalmers Mfg. Co., Milwaukee, Wis. Mr. Sill was formerly an Oregon State College student.

A former New York University student, **OTTO M. REIMER** is now test engineer at the General Electric Co., Schenectady, N. Y.

DR. GUSTAV EGLOFF, newly-elected president of the American Institute of Chemists, told the 20th annual meeting at Atlantic City that the scorched-earth policy of the Netherlanders in Jap-conquered oil fields had been so effective that it will take at least 18 months for the Japanese to get

Dr. Gustav Egloff

the wells into production again. The complicated machinery, he said, is not made in Japan, but must be shipped from Germany. The Russian program of devastating conquered oil fields, he added, would be so effective that it would take Germany a year to rehabilitate the industry in the Caucasus should Germany's attack prove successful.

TOM STIGUM, formerly owner of Stigum's Machine Shop, Hillsboro, Ore., is now connected with the Pointer-Willamette Trailer Equipment Co., Portland, Ore., as shop superintendent.

ALBERT S. HORWATH, formerly an engineer in charge of powerplant installation, experimental research department, Brewster Aeronautical Corp., Johnsville, Pa., has become a project engineer in the development section of the installation department at Pratt & Whitney Aircraft Division, United Aircraft Corp., East Hartford, Conn.

RICHARD K. KOEGLER has been advanced to assistant chief of structures, Buffalo Airport Plant No. 2, Curtiss-Wright Corp., Buffalo, N. Y. He was formerly project structural engineer with the same company.

KENNETH G. BACHELLER is now production liaison engineer, Jacobs Aircraft Engine Co., Pottstown, Pa. He had been with the Menasco Mfg. Co., Burbank, Calif., as design engineer.

Fills Project Chairmanship

Warren A. Taussig

WARREN A. TAUSSIG, automotive engineer, Burlington Transportation Co., Chicago, Ill., has been selected to fill the project chairmanship vacated by **JOSEPH A. HARVEY** when he took a leave of absence from the Pittsburgh Motor Coach Co., and joined the War Department as a civilian. Mr. Taussig at once assumes responsibility for the organization and operation of four committees in the SAE-ODT activity. The committees are: No. 7 – Reconditioning brake drums – limits and tolerances; No. 9 – Reboring and fitting for oversize ball bearings; No. 10 – Plain bushings to replace ball and roller bearings; and No. 15 – Frequency of failures.

GABRIEL MALKIN recently became a production engineer with the Allen Engineering Co., Detroit, representing this company at Ranger Aircraft, Farmingdale, L. I., N. Y. Previously he was process engineer, George Scher Engineering Co., Newark, N. J.

RICHARD L. ANTHONY has joined Rutgers University, New Brunswick, N. J., as professor of mechanical engineering and head of the mechanical engineering department. He had been connected with Bucknell University, Lewisburg, Pa., also as professor of mechanical engineering.

R. F. KOHR recently left the Packard Motor Car Co., Detroit, where he was experimental engineer, and has joined the aircraft development section of the Product Studies Division of General Motors Corp., Detroit.

LARRY REYNOLDS is a toolmaker machinist in the Naval Ordnance Division of Consolidated Steel Corp., Ltd., Maywood, Calif. Before joining consolidated he was manager of the Truck & Commercial Department of Al Stuebing, Hollywood Ford Dealer, Hollywood, Calif.

W. P. LOUDON, former sales engineer, Electric Auto-Lite Co., Toledo, recently joined the U. S. Naval Ordnance Plant, Hudson Motor Car Co., Detroit.

EARLE BUCKINGHAM, professor of mechanical engineering, Massachusetts Institute of Technology, Cambridge, Mass., is the author of a new book entitled "Production Engineering," published by John Wiley & Sons, Inc., New York City. This book is an engineering study; an analysis of the functions and operations that influence ease and speed of operation.

RUSSELL J. ESTELLE, JR. has joined the engineering department of Wright Aeronautical Corp., Paterson. He is a recent graduate of the Massachusetts Institute of Technology.

Formerly sales engineer, Bundy Tubing Co., Detroit, **M. BEN HEFTLER** has joined the staff of the Cycle Weld Laboratories, Chrysler Corp., Hamtramck, Mich.

EDWARD O. GRABOW, JR., who was sales engineer at Tri-City Motors, Inc., Binghamton, N. Y., has become salvage engineer for Link Aviation Devices, Inc., Hillcrest, N. Y., manufacturers of Link trainers and navigation sextants.

A graduate of Michigan State College, **EDWARD M. FOUCH** is now a mechanical engineer in the Master Mechanic Division of Buick Motor Division, General Motors Corp., Flint, Mich.

SIDNEY U. LIEBER recently joined the engineering department of the Philco Corp. at Philadelphia. Mr. Lieber is a former Cooper Union student.

Former Massachusetts Institute of Technology student **GRAHAM H. BELL** is now experimental test engineer at Wright Aeronautical Corp., Paterson, N. J.

Formerly a Purdue University student, **KENNEDY SMITH** recently became an engineering trainee at McDonnell Aircraft Corp., Robertson, Mo.

Formerly a student at the College of City of New York, **GEORGE S. ROTHENBERG** has joined the staff of the Philco Corp., Philadelphia.

★★★★★★★★★★★★★★★★★★★★★★★★

In Military Services

W. COYLE COCHRANE, former editor of the Pittsburgh SAE Broadcaster, monthly Section publication, and publicity chairman of the Section, has been commissioned a

Commissioned QMC Captain

W. Coyle Cochrane

captain in the Quartermaster Corps. He is now stationed at Holabird Motor Base, Motor Transport, at Baltimore. For the past nine years he had been in charge of automotive lubrication and maintenance engineering and fleet sales in the Pittsburgh District for Cities Service Oil Co., and was very active in SAE activities in the Pittsburgh Section.

RAYMOND THOMAS LONG is an automotive adviser in the U. S. Army, Automotive Section, 76th Division, Fort George G. Meade, Md. Before entering the service he was superintendent, automotive maintenance, Sherwood Bros., Inc., Baltimore.

KENNETH JEROME STUART, formerly service and maintenance supervisor, Fleet Sales Division, General Motors Sales Corp., Detroit, is principal inspector of ordnance material, U. S. Army Ordnance Division, Seattle, Wash.

ANDREW H. De Le PAULLE, formerly supply officer, British Purchasing Commission, New York City, is now a procurement officer for the Australian Commonwealth, War Supplies Requirements, Washington.

MAJOR OTTO LESSING, U. S. Marine Corps, is stationed at the Training Center, Marine Barracks, Quantico, Va. In civilian life he was technical service manager, West India Oil Co., S. A., Panama, R. P.

Formerly a sales engineer at Brockway Motor Co., Inc., Brighton, Mass., **CHARLES EDWARD BATSTONE** is now a captain in the Army Air Forces, and is stationed at Wellstone Air Depot, Macon, Ga.

1st LT. JOSEPH A. SCIRA, who recently received a commission in the Army, is in the 422nd Engineers Corps, stationed at Camp Claiborne, La. Before entering the service he was assistant shop superintendent, United Parcel Service, New York City.

E. Q. BECKWITH is a first lieutenant in the War Department, Office of Chief of Ordnance, field service, Washington. In civilian life he was special representative for Phillips Petrolcum Co., Special Products Department, Bartlesville, Okla.

1st LT. CHARLES H. HUNTOON, formerly assistant sales manager, Precision Bearings, Inc., Los Angeles, is chief of the Contract Section (Artillery), U. S. Army, Detroit Ordnance District.

LT. REINHART E. VOGT, U.S.N.R., is now stationed at the Naval Air Station, Corpus Christi, Tex. He was transferred from the Aviation Base, Grosse Ile, Mich.

Former Massachusetts Institute of Technology student **A. A. van TEYLINGEN** is now a second lieutenant in the Army Air Forces, Central Air Corps Procurement District, Detroit.

LT. P. B. ROCKWOOD has been transferred from the 1st Provisional Ordnance Training Company, to the Ordnance School Automotive Section, Aberdeen Proving Ground, Md.

LT. D. C. AKERS, JR., is in the tank engineering office of the Ordnance Department, U. S. Army, Detroit. Before entering the service he had been lubrication engineer, Railway Division, The Texas Co., New York City.

THOMAS F. REINHARDT, stationed at Wright Field, Dayton, in the U. S. Army Air Force, Materiel Center, has been advanced from junior mechanical engineer to assistant mechanical engineer in the Model Test Unit.

ENSIGN THOMAS D. KING, U.S.N.R., is now stationed at Pearl Harbor, Hawaii. He was formerly industrial salesman, Shell Oil Co., Inc., Honolulu.

ENSIGN HERBERT C. SUMNER, U.S.N.R., is at the Naval Experimental Station, Annapolis, Md. Before entering the service he was research engineer at Ethyl Gasoline Corp., Detroit.

CHARLES W. KYNOCH is in the U. S. Army, Motor Transport Service, Office of the Quartermaster General, Washington. He had been chief engineer in the Export Division of the Chrysler Corp., Detroit.

HOWARD JARMY has joined the Air Service Command, and is stationed at Wright Field, Dayton. Previously Mr. Jarmy was a student at the Illinois Institute of Technology.

WILLIAM A. McCUTCHEON, formerly a corporal in Headquarters Company of the 5th Marines, AEF, is now a major in the Transport Division of the Quartermaster Corps. Major McCutcheon has been granted a military leave of absence from his position as superintendent of transportation of the Washington Gas Light Co. of Washington, D. C.

ROBERT H. ADAMS, JR., is a captain in the U. S. Marine Corps, second Training Battalion, Camp Elliot, San Diego, Calif.

R. G. BRADLEY, formerly vice president and general manager of the Harris Products Co., has organized and is vice president of Bushings, Inc., to manufacture rubber-backed bearings for tanks, aircraft, and other automotive uses, under the Silentbloc patents.

After two and one-half years of activity in connection with machine tool design and production **L. P. CROSET** has returned to the internal-combustion engine field, having joined Davey, Paxman & Co., Ltd., Colchester, England, as section leader in charge of diesel engine development. He had been designs investigator, William Asquith, Ltd., Highroad Well Works, Halifax, England.

RALPH R. CLARKSON is now a first lieutenant in the U. S. Air Forces, and is stationed at Wright Field, Dayton. He is in the Production Engineering Section of the Aeronautical Equipment Branch. Before entering the service, Lt. Clarkson was Detroit representative of Latex Fiber Industries, Inc., Beaver Falls, N. Y.

Formerly a Massachusetts Institute of Technology student, **ARNOLD C. FIELDS** has joined the Equipment Division of the Naval Torpedo Station, Newport, R. I., as senior engineering aide.

JAMES F. McCLELLAND, JR., is a student engineer in the Chrysler Institute of Engineering. He is a graduate of the Massachusetts Institute of Technology.

CAPT. FRANCIS L. WALLACE is a pilot for American Export Airlines, New York City. He was formerly connected with United Air Lines Transport Corp., Chicago.

Former Purdue University student **JOHN P. GUERRA** is now liaison engineer at Bell Aircraft Corp., Buffalo, N. Y.

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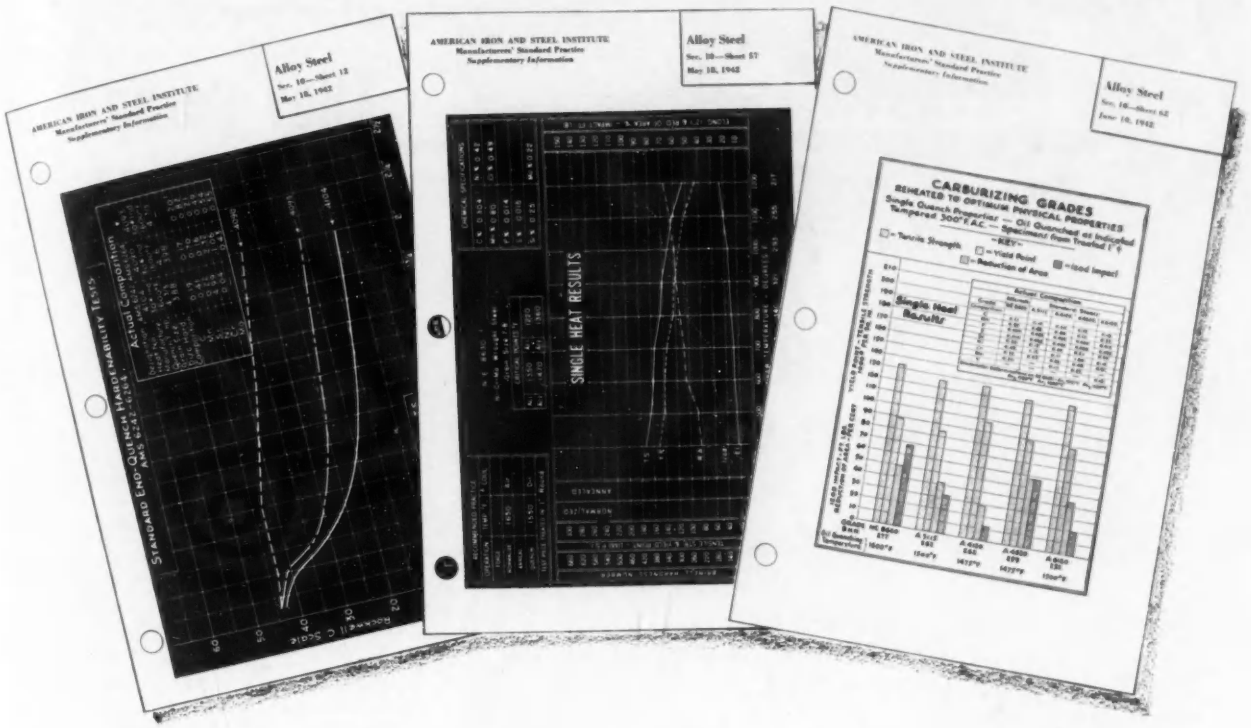
Norman Mitchell

Norman Mitchell, for many years connected with the Asiatic Petroleum Co., Ltd., London, England, as engineer, died on May 10, at the age of 55, after an illness of several months. His work took him far afield to various European countries, Egypt, Palestine, Australia, and the Far East. He visited the United States in 1934, 1935, 1937 and 1939. During the last war he was a Leutenant in the Royal Naval Air Service and in the Royal Naval Volunteer Reserve.

SAE Coming Events

Aug. 20-22	West Coast T&M Meeting Biltmore Hotel – Los Angeles, Calif.
Oct. 1-3	National Aircraft Production Meeting (and Aircraft Engineering Display) Hotel Biltmore – Los Angeles, Calif.
Oct. 7-8	National T&M Meeting Hotel Pennsylvania – New York
Oct. 22-23	National Fuels & Lubricants Meeting Tulsa Hotel – Tulsa, Okla.
Jan. 11-15, 1943	War Production-Engineering Meeting (and Engineering Display) Book-Cadillac Hotel – Detroit, Mich.

Test Data on NE Steels Made Available to Assist Users



Sample charts: (left) hardenability, (center) physical properties versus draw temperature, (right) comparative physical properties

TO accelerate the successful adoption and universal acceptance of the new NE (National Emergency) steels and of the 4000 series carbon-molybdenum steels, which contain minimum amounts of scarce alloying elements such as chromium and nickel, the American Iron and Steel Institute, under WPB sponsorship, is making available to all steel users preliminary data in the form of charts covering tests on these steels, as well as on certain of the AMS (Aircraft Material Specifications) steels.

SAE-AISI Pioneer Specs

Ground work for the NE specifications was laid back in December, 1941, when a group of top metallurgists, representing the SAE and the AISI, developed a reduced list of steel compositions to conserve critical materials, at the request of OPM. For further details of the NE steels, including chemical compositions and possible alternates for SAE and AISI "standard series" steels, see the April, 1941, issue of the SAE Journal, pp. 19-20.

The data being made available are the result of cooperative work between steel users and steel producers. They include end-quench hardenability test results on single heats; single-heat results showing tensile strength, elastic limit, reduction in area, and Izod impact values on different sizes of bar stock for various draw temperatures; and charts comparing the foregoing physical properties and compositions of these emergency steels with those of the various "standard series" SAE-AISI steels that they are most likely to replace.

The first batch of these charts is known as "Alloy Steel, Section 10," dated May 18, 1942, and comprises 58 loose-leaf sheets; it includes data on 12 NE steels: NE 8024, 8124, 8339, 8442, 8547, 8620, 8630, 8724, 8739, 8744, 8749, and 8949; and 7 hardenability charts on AMS steels: AMS 6240-6260, 6242-6264, 6290-6274, 6310-6320, 6312-6322, 6410, and 6412-6425. Included in the second group of charts released by the AISI are 5 on the 4000 series carbon-molybdenum steels, and a number of comparative physical property charts.

As more and more test results are received from users who have been sent samples of the various emergency steels by different steel producers, additional data will be made available from time to time by the AISI. It should be emphasized that these data are the result of free and unrestricted cooperation between the steel producers and users; and that the work has been carried on under the sponsorship of the War Production Board, with the American Iron and Steel Institute acting as the medium for publishing and distributing the data.

Steel users desiring these charts can receive them without charge by writing to the American Iron and Steel Institute, 350 Fifth Ave., New York, N. Y.

WPB Chairman Donald M. Nelson, completing a tour of automotive plants engaged in war work, said American industry could "more than double present production by 1944."

He commended the "energy and enthusiasm the automobile industry has put into the job of building war materiel.

"They have the engineering talent and the ingenuity to tackle the toughest problems.

"They've learned how to cut corners on production."

'Purp' Brings America Closer To Complete Materials Allocation

MATERIALS for American armament manufacturing have finally reached the realm of bookkeeping. Priorities Regulation No. 11 (June 10) is WPB's latest move to control the flow of every metal used in arms. It is the Production Requirements Plan, dubbed "purp," and requires:

- Army arsenals, Navy shipyards, other government agencies,
- All government contractors using more than $5,000 worth of metal a quarter, and
- All non-defense manufacturers using this amount or more, to:

1. File quarterly statements on Form PD-25A indicating:
   - Estimate of requirements for the coming quarter,
   - Actual amount used in previous and current quarters, and
   - Inventories on hand, in both raw materials and in various stages of fabrication.

More than 7000 companies are using the plan on a voluntary basis, more have been coming into the scheme each week, and none have withdrawn, James S. Knowlson, director of WPB's Industry Operations Division, said in discussing the details of the PRP with the SAE Journal. Almost every automotive manufacturing plant in the country, he thought, has been using the scheme.

Thus WPB expects to keep a set of books on the materials in the country in order to control their flow to guns, ammunition, tanks, airplanes and other weapons. For more than two years, England has had a fairly accurate census of materials, and has developed a system of allocation to all manufacturers.

The WPB priorities system has failed to provide the control needed, because there is no posteriority – hence "priority" means nothing. Today, every defense manufacturer is up at the head of the queue, and the queue has no tail.

The Combined Production & Resources Board, established jointly by the President and Prime Minister Churchill, will set up armament requirements of the United Nations from reports of the Allied general staffs. It will continue to be WPB's responsibility to see that quotas set for American arms output are achieved, and this plan is calculated to direct the flow of materials to those factories which are in most need of them for arms and essential civilian manufacturing.

The Army and Navy will continue to set priorities as in the past, but in effect the manufacturers will be less concerned with the priorities themselves, but will get materials allocated to them.

Obviously, there can be no guarantee that any given manufacturer will be able to get all the materials he may need. In every automotive plant doing war work earlier estimates of requirements have proved to be far too small. *As manhours per part or per unit have decreased, materials requirements have multiplied.*

However, it has been apparent to WPB materials executives that the priorities system was not adequate to handle the distribution of materials as our peacetime economy began its rapid shift to a wartime economy. More than 60,000 applications for special relief required by manufacturers to complete their contracts have been flooding WPB offices every week, for example, indicating the inability of Priorities to function properly.

On the other hand, the plan is not defined by William L. Batt, chairman of the WPB Requirements Committee and former director of the Division of Materials, as out-and-out allocations. But he hopes that a "kitty" of critical materials will be built up by PRP in eliminating unneeded inventories in some factories, and making these available for others which face slowdowns or wide-scale layoffs because of materials shortages.

Alloy Scrap Segregation

TIME-HONORED techniques of automotive and other large manufacturing plants in systematic segregation of scrap metals, by grade of alloy content, have now become the law of the land.

The Alloy Steel Scrap Segregation Order (M-24-c, June 17) requires every manufacturer who:

- Produces 10 tons or more of scrap from a list of nine constructional steels per month, or
- Produces one ton or more of scrap from a list of nine high alloy steels per month, to collect and keep such scrap segregated for shipment to steel mills.

Alloys covered in the two lists of steels are nickel, chromium, tungsten, and molybdenum. WPB expects savings of these metals to reach 50% of the amounts now saved by steel mills.

Major automotive companies have been segregating scrap metals for years. As the market prices drop, however, such programs tend to become unprofitable.

Recently materials shortages have stimulated scrap segregation, even among plants where this practice had been unknown in times of plenty.

WPB has not issued recommendations or instructions explaining to smaller companies how to set up a scrap segregation program.

Failure to comply with the mandatory order may result in prosecution.

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'Open-End' Contracts Will Be Renegotiated

RENEGOTIATION of "open-end" government contracts is provided for by WPB's Directive No. 3, issued to spread orders, speed deliveries, and make maximum use of existing facilities.

"Open-end" contracts obligate the government agency to purchase its entire requirements of a specified product over a stated term. The manufacturer agrees to deliver the entire amount required during the period.

Because requirements have been upped manyfold since Pearl Harbor, WPB has decided that other companies should be permitted to participate.

A Message to SAE Members from Major-Gen. Levin H. Campbell, Jr.

New Chief of Ordnance, U. S. Army

THE first stage of this war, the Battle of Production, is now being won by American Industry. We who have seen the production figures do not doubt the outcome. What was once considered impossible is now being accomplished daily. Our victory in this fight for production is now assured.

In that step toward victory the automotive industry has played an important part. Under the leadership of automotive engineers, miracles of plant conversion have been performed. No task has been too formidable for the ingenuity of the automotive industry. America's tradition of mechanical skill has never been more strongly upheld. The men who invented and developed our mass production technique until it was the foremost in the world have applied their talents to the mass production of the tools of war. The ceaseless flow of this materiel now presents our enemies with a problem which they may well find insoluble. The vast, broad stream of arms and equipment flowing from our plants indicates the inevitability of our ultimate victory.

It has been said that the new Army of the United States is truly a citizens' army. That is so in the widest possible sense. For our Army includes not only the young men who are being called up from all walks of life. It includes more than the specialists who are joining the Army in increasing numbers. In a larger meaning of the term, this great citizens' army includes those many others, in plant and factory, in the offices of management and the shops of machine toolmakers, who contribute their skill and brains and heart to the speedy production of war materiel. Their labor and ability are combining to make the Army of the United States one of the best equipped fighting machines in the history of warfare. In the final victory of the forces of democracy, civilian workers of the army who helped us win the initial Battle of Production will have played a major part.

– L. H. CAMPBELL, Jr.
Major General, Chief of Ordnance

Photo by Ordnance Dept., U. S. Army

Production chief of the nation's $30 billion armament program for the Army for the past few months after establishing the backbone of America's arms program, Lt.-Gen. Levin H. Campbell, Jr., was appointed Chief of Ordnance, War Department, effective June 2. His former title was Assistant Chief of Industrial Service – Production, and he was responsible for plants and facilities for manufacturing explosives, ammunition, tanks, guns, bombs and thousands of arms items. General Campbell graduated from the United States Naval Academy in 1909.

Curbs Sales of Research Instruments and Equipment

Shortages of critical materials for scientific equipment have resulted in a sharp "no" to university and other private laboratories who want such instruments for other than research connected with the war effort.

The limitation order (L-144, June 12) affects every automotive manufacturer in the country, as well as the 3000-odd college and industrial laboratories throughout the country.

To buy or sell such equipment containing a list of 13 materials and their alloys, the prospective purchaser must certify that the instrument will be used only for:

- Research on, or analysis of, materials;
- Training Army, Navy or other authorized personnel – such as those of Lend-Lease countries;
- Research by or for government agencies or Lend-Lease countries;
- Repair of scientific instruments for the above.

However, the director of Industry Opera-

tions may use his discretion in permitting purchases beyond the limits imposed. E. R. Schaeffer of the Division is the administrator of the new order.

Zinc Now Allocated

COMPLETE allocation of metallic zinc has been ordered by WPB (M-11, Amended). Zinc oxide and zinc dust were put under the pool arrangement, putting these byproducts under control (M-11-a).

Provisions:

- Consumers apply monthly to Director of Industry Operations, J. S. Knowlson, for allowance certificate (Form PD-94-a);
- This he forwards to producer with his order:
- The producer endorses the certificate to amounts shipped, by grades;
- Zinc dealers must also apply for certificates (Form PD-450);
- Both are due at WPB by the 15th of the month.

However, small purchases from dealers require no certificates, but amounts will be limited.

1/5 War Funds Are Spent

LESS than one-fifth of the government funds available for the nation's war effort have been spent, although nearly five-eighths have been committed for.

About $30,615,000 has been spent of the $166,435,000,000 made available since June, 1940, by Congress.

May expenditures reached the all-time high of about $3,853,000,000, or a 10% gain over April's outlay.

The lag in actual expenditures, as compared with the funds obligated by letters of intent, contracts, and other commitments, is due to the time required for industries to build factories and additions, and to retool for arms manufacture.

Presidential Order Is Expected To Remove State Line 'Barriers'

GOVERNMENT transportation officials are expecting an executive order from the President putting into effect a uniform weight limitation code for highways for the duration.

Forty-seven of the 48 states of the union have agreed that, for the war period, as many state barriers should be eliminated as possible. However, without resorting to new legislation, some of the governors reported that they had no power to enforce such a code.

Details of a uniform code, based in part on the SAE Load & Dimension Limitations on Motor Vehicles, but including a bridge formula developed by the Public Roads Administration, have been sent to each governor and highway administration officials.

On May 5, 6, and 7, the question was discussed at the Federal-State Conference in Washington. Developments:

- Commissioner Thomas H. MacDonald of the PRA explained that the code was a proposed *minimum* regulation under which none of the states would be asked to go. *Instead of a ceiling, it was to be a floor.* This so-called "New York Plan" had been ratified by the northeastern states (see "Proposed Uniform Regulations," below).
- Confirming this ratification, the plan was sent to governors of the 48 states, asking governors their opinions in respect to the issuance of an executive order, putting the code decided upon in effect for the duration. Only Colorado dissented, holding that legislation was preferable.
- This action was reported to Secretary of Commerce Jesse Jones and other interested officials dealing with motor transportation.

Delays and reloading at state lines, necessitated by various state regulations, have caused considerable complaint from Army, Navy, and WPB officials charged with speeding arms production.

Proposed Uniform Regulations

(1) WIDTH. No vehicle, unladen or with load, shall have a total outside width in excess of 96 in.

(2) HEIGHT. No vehicle, unladen or with load, shall have a height in excess of 12 ft 6 in.

(3) LENGTH.

(a) No single vehicle, unladen or with load, shall have an overall length, inclusive of front and rear bumpers, in excess of 35 ft.

(b) No combination of vehicles, unladen or with load, shall have an overall length, inclusive of front and rear bumpers, in excess of 45 ft.

(c) Combinations of vehicles shall consist of not more than two units. A truck with semi-trailer shall be considered as two units.

(4) WHEEL AND AXLE LOADS.

(a) The total load on any single wheel shall not exceed 9000 lb and the total load on any single axle shall not exceed 18,000 lb.

(b) When the distance between any pair of axles is less than 10 ft, the total load on either of the axles shall not exceed 18,000 lb and the total load on the two axles shall not exceed 32,000 lb.

(c) No axle loading shall be in excess of 10% of the Tire and Rim Manufacturers Association recommended loading for the size and number of tires with which that axle is equipped.*

(5) GROSS WEIGHTS.

(a) Subject to the limitations imposed on wheel and axle loads, the gross weight, with load, of any vehicle having two axles shall not exceed 30,000 lb.

(b) Subject to the limitations imposed on wheel and axle loads, the gross weight, with load, of any vehicle or combination of vehicles having three or more axles shall not exceed 40,000 lb.

(6) SEASONAL REGULATION. The maximum axle loads and gross loads permitted by these regulations are subject to a reasonable reduction by State authorities for a reasonable period during the spring of the year if the road subgrades have been dangerously weakened as a result of thawing after deep frosts.

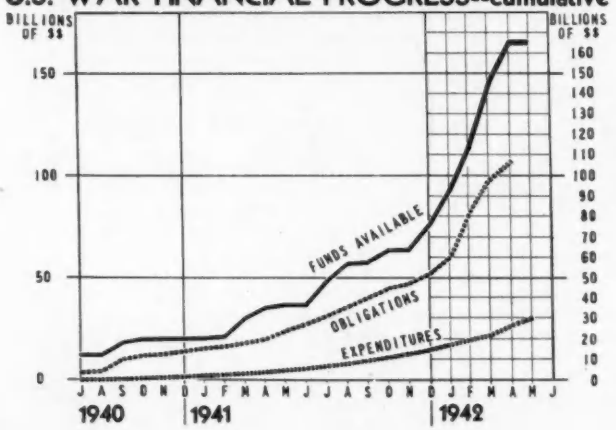
(7) ALTERNATE REGULATIONS. The limitations on sizes and weights of motor vehicles set forth in the above regulations are the most restrictive that may be enforced in any State during the period of the national emergency but less restrictive limitations may be permitted in any State at the discretion of the State authorities.

(8) SPECIAL CERTIFICATES. For all sizes or gross loads in excess of the limits herein provided, special certificates shall be issued by the proper State authority. The total gross load shall be limited by the following formula:

W = C (L ÷ 40), in which
W = gross weight in pounds
L = distance, in feet, between the foremost and rearmost axle of any group of two or more axles
C = 750, when L is greater than 18
650, when L is 18 or less.

* Modification suggested by Commissioner MacDonald.

U.S. WAR FINANCIAL PROGRESS--cumulative



Billion dollars a week is current rate of U. S. war cost, Harold Smith, Budget Director, says. He expects $70 billion will be spent during the next 52 weeks.

Auto Service Business Gets New WPB Section

Dewey M. Crim has been appointed chief of the new Automotive Section, Services Branch, Division of Industry Operations, of WPB.

Functions of the Section:

- To help automotive service stations and repair garages to get machinery and equipment to continue to service motor vehicles, and
- To help those repair shops which are anxious to manufacture armaments and parts to get subcontracts, materials, and machinery for this work.

Materials Shortages Force Industry To 'Patch and Pray' Batt Says

WAR production demands have created a shortage of materials in the U. S. that will get tougher as the war progresses, William L. Batt, chairman of the Requirements Committee, WPB, and A. I. Henderson, newly-appointed director, Materials Branch, told the SAE Journal.

Past months, they said, have been relatively "easy." Military requirements have taken from the civilian to meet its needs. This pool is nearly dry. From here on out it will be a continuous problem to provide materials to meet the needs of our fighting forces. "Industry must get ready to 'patch and pray' to keep existing equipment at work," Mr. Batt said.

What is needed:

1. Long-range planning of material requirements and careful scheduling.
2. Revision of specifications to reduce the amounts of scarce materials.
3. Widespread use of substitutes.
4. Vast increase in civilian cooperation with the national salvage program to speed up the flow of scrap, particularly metals and rubber.
5. Careful handling of scrap and secondary metal by industry.

WPB now is stimulating production by:

- Building new plants,
- Exploiting low-grade ores,
- Paying premium prices for copper, lead and zinc, and
- Recommending Federal financing for new projects in materials production.

Factual report:

- **STEEL:** Many thought, before the war, that the U. S. wouldn't face a shortage. We had capacity for approximately 83 million tons a year. In 1939 we used only 52 million tons.

Steel capacity already has been increased approximately five million tons. Of the projected 10 million ton increase, now being reviewed at the direction of WPB, 65 to 70% probably will be completed.

This curtailed expansion program will cost about $1.5 billion, with industry providing $500 million.

All possible scrap must be fed back into the furnaces. Mills could be producing more of the critical types of steel today if they had more scrap with which to do it.

Production for 1942 may go to 85 million tons.

- **NICKEL:** We do not have enough nickel to fill all demands in spite of the fact the U. S. and its allies control practically all the world's nickel supply. Canada produces 80 to 85% of the world's nickel and New Caledonia is next.
- **MANGANESE:** The basic steel alloy. About 14 lb are necessary to produce a long ton of steel.

Before the war the U. S. imported most of its manganese, and imported more than 500,000 tons of manganese ore in 1939, while we produced some 30,000 tons here.

This year's domestic production may reach the rate of 600,000 tons a year from low-grade ores. Increasing imports from Cuba and several South American countries and a sizable stockpile on hand are reported.

Development of low-grade domestic manganese ores will cost the government some $40 million and private industry about $6 million more.

- **CHROMIUM:** Before the war we imported all but a negligible quantity of chromium. Domestic production was a couple of thousand tons a year as against a consumption, in 1939, of 320,000 tons.

This year we will use about three times that amount, or almost as much as world production in 1939.

We have a sizable stockpile and we continue to get some chromium from abroad.

The government is spending more than $10 million on chrome development and private industry about $1½ million.

- **TUNGSTEN:** In the spring of 1941 the Geological Survey discovered tungsten deposits in Valley County, Idaho, and in less than a year this mine has become the largest domestic tungsten producer.

It is expected to triple our 1939 output, about 4000 tons, this year. Tough steel for high-speed machine tools and linings for gun barrels is tungsten alloy. New plants also have been built in Utah, California and Nevada for increased treatment of deposits already known.

Rapid action by the National Defense Advisory Commission two years ago is responsible for a large part of the present stockpile in the U. S.

Large stocks of the metal in Indo-China were in danger of falling into the hands of either the Nazis or the Japs. Within 48 hr the metal had been purchased and was promptly shipped here.

- **ALUMINUM** is limited by facilities to make it, rather than the ore. Factors:

Construction of new plants, available power, and the heavy, hard-to-make machinery necessary to fabricate aluminum.

The initial program of 850 million lb annual capacity has been completed and now is producing.

More than 600 million lb in addition will be in production about Aug. 1. Four of the seven plants of this additional capacity have been completed. A second program of this same size has been approved and a great deal of the preliminary work accomplished. In addition, we expect to receive some 450 million lb from Canada next year.

This will give us a total supply in 1943 of more than 2.5 billion lb of aluminum, as compared to primary production in 1939 of 330 million lb. The government is spending approximately $568 million on this expansion program and private industry $85 million.

Actual production of aluminum this year should be approximately 1,083,000 lb, not counting secondary production or imports.

- **COPPER:** War demands for copper are tremendous and the current outlook is for a constant and growing shortage of this vital metal.

However, 98½% of present domestic

(*Concluded on page 64*)

New Plant to Help Win the War Faster

SAE members R. E. Carpenter, vice president, Spicer Mfg. Corp. and Lt.-Gen. William S. Knudsen (left and center) (shown here with John D. Biggers, president, Libby-Owens-Ford Glass Co. and formerly associated with Gen. Knudsen in the war production program) chat during the giant rally held May 9 to celebrate the completion of the Spicer Tank Arsenal at Toledo. Acting as the President's personal representative, Gen. Knudsen inspected the plant and told 3500 Spicer workers: "We've got to win this war quickly. If we don't do it quickly, we've got to win it anyway."

'One Shot' Firm Collects Copper

COPPER and brass, once destined for door knobs, roofing, ash trays and hundreds of non-essential uses, will be bought by the Copper Recovery Corp., a "one shot" non-profit organization formed by the Metals Reserve Co., a subsidiary of Reconstruction Finance Corp. The company will be dissolved when the purchases from manufacturers have been completed.

About 300,000 tons of metal, 255,000 of which will be copper and 45,000 zinc, will be turned over to munitions factories.

This is nearly one-third of the total U. S. consumption of copper in 1939, or almost three times the total automotive use of the metal for that year.

Already a large part of the materials have gone into armament plants direct from the owners, without involving government financing. Considerable tonnage of partially or wholly assembled products, which could be used for arms manufacture, have gone direct to these contractors.

WPB has the power to requisition materials and products if the owners refuse established prices.

Between 300 and 500 people will be employed, some as long as a year, to complete this transition of non-essential copper and brass to armaments, WPB estimated.

✪

Transportation Priorities

WPB has formed a Transportation Committee to get information from WPB divisions as to anticipated transportation requirements, and to make recommendations with respect to preferential movement of traffic within the U. S.

- Recommendations will be submitted to the Director of Industry Operations, who may transmit them in the form of certifications, instructions, and directives concerning preferential movement of materials to the Office of Defense Transportation.

Will Set Priorities

When transportation facilities are inadequate to move all freight ready to be shipped between certain points within a definite period of time, the committee will determine which types of freight should be given preference;

- Will so inform the Director of Industry Operations, and
- The Director will then transmit the recommendations to the ODT for action.

The new TC of WPB is headed by Edgar B. Stern, New Orleans, a cotton merchant.

Materials Squeeze Gets Tighter

MORE than a score of automotive materials have been shifted from less to more critical groups in the third of a series of provisional reports on the relative scarcity of materials in this one-time land of plenty. Issued by Harvey A. Anderson, chief, Conservation and Substitution Branch, Bureau of Industrial Conservation, WPB, the report reflects the accelerated tempo of war production.

Because of space limitations, only those materials generally used by automotive factories manufacturing armament items are included in this edited listing, shown below.

Group I – Materials, the supplies of which are not sufficient for both war and civilian use. In many instances, there is a shortage for armaments, and military officials are studying the possibilities of alternate materials specifications (see p. "A" to "C") to relieve severe shortages.

Group II – Materials whose supply is less than either actual or estimated demand. However, these are not considered to be as critical as the materials in Group I. Supply and use are, in many cases, fairly well balanced partly because many consumer industries have been turned into arms manufacturing.

Group III – Practically no metals or chemicals are in this classification. However, whether mined, quarried, or grown, these materials represent labor, processing, and transportation which are all becoming more critical.

Preceding listings appeared on p. 25, SAE Journal, April, and SAE Journal, p. 26, May. As changes are made they will appear in future issues.

GROUP I

The available supply of the following materials is inadequate for war and essential civilian uses and in many cases for war purposes alone.

METALS

- Alloy iron
- Alloy steel
- Aluminum
- Aluminum pigments
- Cadmium
- Calcium-silicon
- Chromium
- Columbium
- Copper
- Copper scrap
- Iridium
- Magnesium
- Manganese, electro
- Nickel
- Nickel scrap
- Rhodium
- Tantalum
- Tin
- Tinplate and terneplate
- Tungsten
- Tungsten carbides
- Vanadium
- Wrought iron
- Zinc (high grade)

CHEMICALS

- Acetone
- Alkyd resins
- Alumina
- Ammonia
- Benzol
- Butadiene
- Chlorinated hydrocarbon solvents
- Chlorine
- Cresols
- Diphenylamine
- Methyl methacrylate sheets
- Naphthalene
- Pentarythritol
- Phenol
- Phenol formaldehyde resins & plastics
- Phosphates: tricresyl and triphenyl
- Polystyrene
- Polyvinyl chloride
- Sodium nitrate
- Sulfur chlorides
- Toluol

MISCELLANEOUS PRODUCTS

- Asbestos, long fiber
- Corundum
- Graphite, Madagascar flake
- Jewel bearings
- Lumber: certain grades of hard & soft woods
- Mica, block
- Natural resins, except rosin
- Quartz crystals
- Rubber: chlorinated, crude, latex, reclaimed and synthetic
- Shellac
- Tung Oil

GROUP II

Materials that are essential to the war industries but the supplies of which are not limited as those of Group I.

METALS

- Aluminum scrap, No. 12 remelt
- Antimony
- Calcium
- Ferrosilicon iron: gray, cast, and malleable
- Lead
- Lithium
- Manganese, ferro
- Mercury
- Molybdenum
- Palladium
- Pig iron and scrap
- Platinum
- Ruthenium
- Silicon and alloys
- Steel: bessemer, carbon, basic and scrap
- Zinc, low grades
- Uranium

CHEMICALS

- Alcohol, ethyl and methyl
- Butanol
- Carbon tetrachlorides
- Formaldehyde
- Glycol
- Halogenated hydrocarbon refrigerants
- Lactic acids and lactates
- Mannitol
- Methyl methacrylate powder
- Phosphorus
- Potassium: perchlorate and permanganate
- Sorbitol
- Tetraethyl lead
- Urea formaldehyde plastic
- Vinylidine chloride plastic
- Xylol

MISCELLANEOUS PRODUCTS

- Bauxite
- Cellophane
- Cellulose nitrate, acetate, and other derivatives
- Cork
- Cryolite
- Diamonds: industrial and dies
- Glues: animal and vegetable
- Glycerine
- Lead pigments
- Leather
- Magnesite
- Mercury pigments
- Mica splittings
- Parchment paper
- Rutile
- Vulcanized paper
- Zircon

GROUP III

Materials that are generally available in significant quantities as substitutes for less available materials.

METALS

- Gold
- Indium
- Osmium
- Silver

CHEMICALS

- Carbon black
- Chromic acid for plating
- Muriatic acid
- Sodium metasilicate

MISCELLANEOUS PRODUCTS

- Asbestos, common
- Asphalt
- Casein
- Cement, Portland
- Ceramics
- Emery
- Flint
- Gilsonite
- Glass
- Gypsum and products
- Kraft paper
- Lignin plastic
- Lumber and millwork: low grades of hard and soft woods. All grades of gum woods
- Mica, ground
- Mineral wool
- Paper (except II)
- Paperboard
- Petroleum products: crude oil, gasoline, lubricating oil and paraffin.
- Plywood, unrestricted binder
- Rosin and derivatives
- Silica sand
- Soybeans, oil and protein
- Sulfur
- Vermiculite
- Wallboard
- Zinc oxide (American process)

COMPLETE scarce material lists (including other than automotive) are available from the Bureau of Industrial Conservation, War Production Board, Washington, D. C. Ask for WPB-1254.

SAE-ESD Aircraft War Production Meeting Draws Over 4000 Engineers

(*Continued from page 32*)

pared with the other expenses of the fighting forces – a ratio that has increased 10 fold in the past 100 years.

Discussing in more complete detail the factors affecting morale, Mr. Wright brought out that such elements as confidence in the justice of our cause, the inspiration obtained from contemplating examples of the courage of our allies and of those countries now under Nazi rule, the confidence in our leaders and in our equipment, and eventual hope for complete victory, are highly important. Special emphasis was placed on a knowledge of the progress of the production effort as a morale builder. Mr. Wright's blueprint of victory was "Bombs, Blockade, and Rebellion."

The status of the production effort as it relates to aircraft was next discussed. Mr. Wright divided changes in design into three categories: modernization changes; those made in the interest of standardization; and minor refinements. Only the latter were considered avoidable in many cases.

The present organization set-up to handle all phases of the production of aircraft, engine and allied equipment was then described. Each division as it affects machines, materials, and labor, was discussed. Current and future shortages in these three elements were anticipated, and the methods now being applied to reduce or avoid them were disclosed. Information on the problem of production unbalance, its causes and remedies, the problems involved in servicing, and adequate supplies of spare parts, priorities, allocations, conversion of facilities, subcontracting, and numerous other angles, were covered.

Mr. Wright then gave a report of the progress of the production program, and closed with a brief discussion of post-war problems and what steps may now be taken to assure a lasting peace. Highlight statements made by Mr. Wright included the following:

"What we need to get is justice combined with force; and to me the possibility is hopeful because of the advent of air power."

"There must be a severe curtailment in civilian uses for many critical materials such as nickel, copper, tin and vanadium during 1942, and universal sacrifice in 1943."

"Last October the percentage of female workers to the total was but 1% in the airframe industry, with a negligible number engaged in making engines and propellers. Now the percentages are 10 for airframes, 5 for engines and 3 for propellers, with some companies employing 25, 15 and 5% respectively. We may see the figures eventually go to 40 and 20 to 25%."

"A reconditioned airplane at the scene of action is more valuable than a new airplane 8000 miles from the front."

"The tools in an automobile factory usable for producing aircraft or aircraft engines total not over 35% in any case and average about 20%. In many cases the usable maximum is but 15%."

"The record justifies our sights at the level of airplane production set by the President early this year that calls for 60,000 planes this year and 125,000 next."

"A year from now both in rate of production and air force total strength, we will predominate over the Axis powers by 2 to 1."

"The United Nations are now producing 27% more planes than the Axis powers."

Aircraft-Engine Oil Systems

The correlating papers by Messrs. Dolza and Karcher on dealing with high altitude operation of oil systems were released for presentation but not for publication in full. Army-approved summary of these important contributions is as follows:

For correlating the performance of oil systems under ground and altitude flight conditions, a special altitude chamber was built. The chamber is capable of testing a complete oil or coolant system at various absolute pressures and altitudes of flight, thereby eliminating the large errors in the measurement of oil and coolant flow encountered when the system is surrounded by room pressure, and only the oil or coolant is subjected to depression to simulate altitude operation.

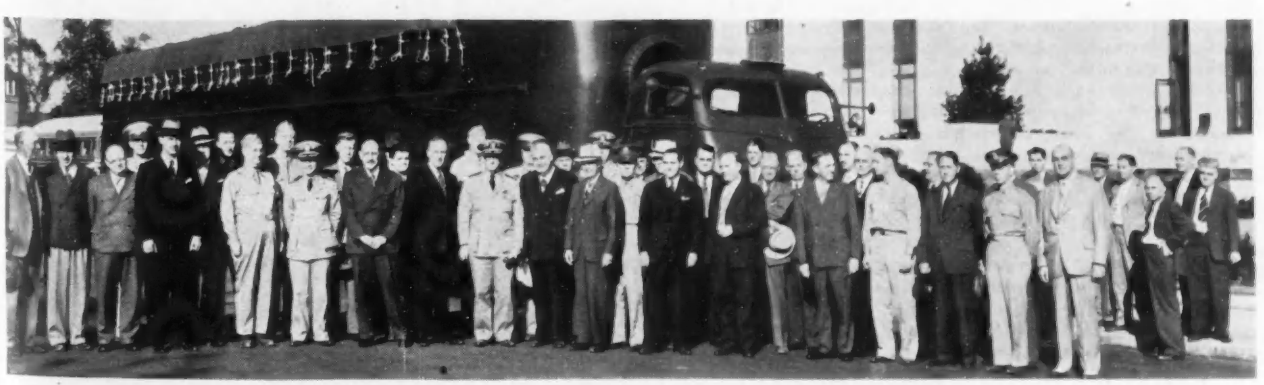
The system was arranged to maintain a fixed oil level in the aircraft oil tank during flow measurements, by means of a float-operated air valve. By setting the air valve up or down, the effect of the oil level in the tank upon the pump capacity can be determined. Temperatures throughout the system are measured by thermocouples. Bourdon gages at various points in the system are used to measure oil pressures.

After defining the geometric displacement of an oil pump, the causes of reduced displacement were given as: Internal leakage between the pressure and intake sides of the pump; incomplete filling of the teeth space; and, aeration of the liquid being pumped. A series of equations was then developed and correlated into a formula which took these three causes of reduced capacity into consideration. The values computed with this formula were shown to be very close to results obtained in the altitude laboratory and flight tests.

In an analysis of the ability of a gear type pump to prime, its limitations as an air compressor in exhausing the air from the intake to the outlet side, were discussed. The most suitable limits for pump gear dimensions were established, followed by an analysis of the effect of check valve pressures in reducing the ability of the pump to prime. It was shown that the pump will not prime when the back pressure of the check valve exceeds the air pressure which the pump can produce. Consequently, it was recommended that check valve pressures be kept at a minimum, and that lubrication be provided for the gears under all conditions.

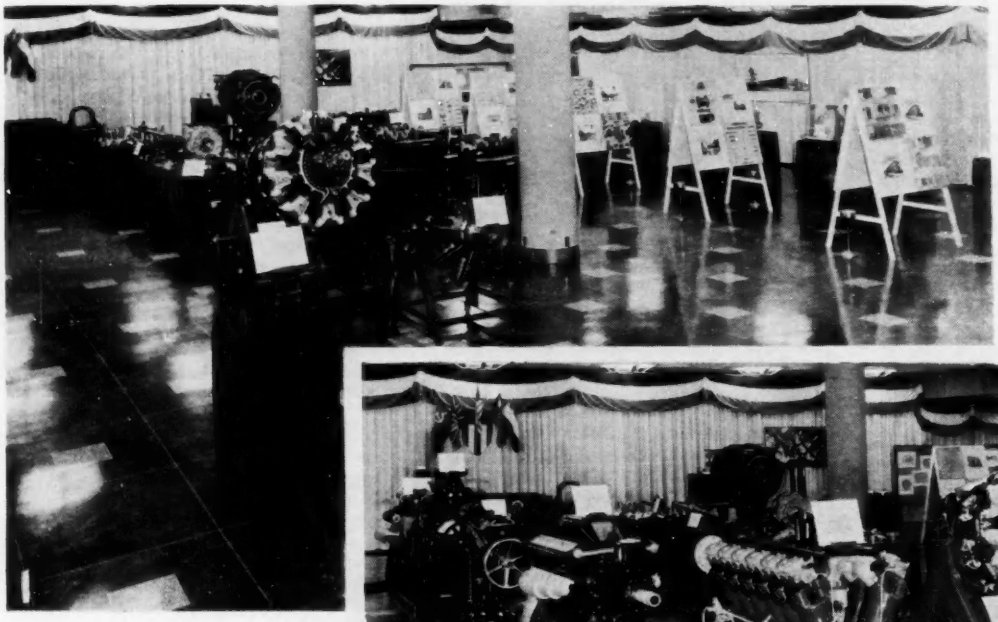
The effect of the attitude or angle of the engine relative to the horizontal was studied in the altitude chamber, particularly with reference to the effect of slow "rolls" of the plane, dive and climb. Some pendulum types of tanks were found satisfactory with 30% of oil in the tank. Tanks without pendulum were not satisfactory in the roll maneuvers. Nor were tanks with large horizontal versus vertical dimensions either in dive or climb. It was concluded that oil tanks for pursuit planes should be capable of maintaining an oil supply in all flight attitudes of which the airplane is capable, including the slow barrel rolls.

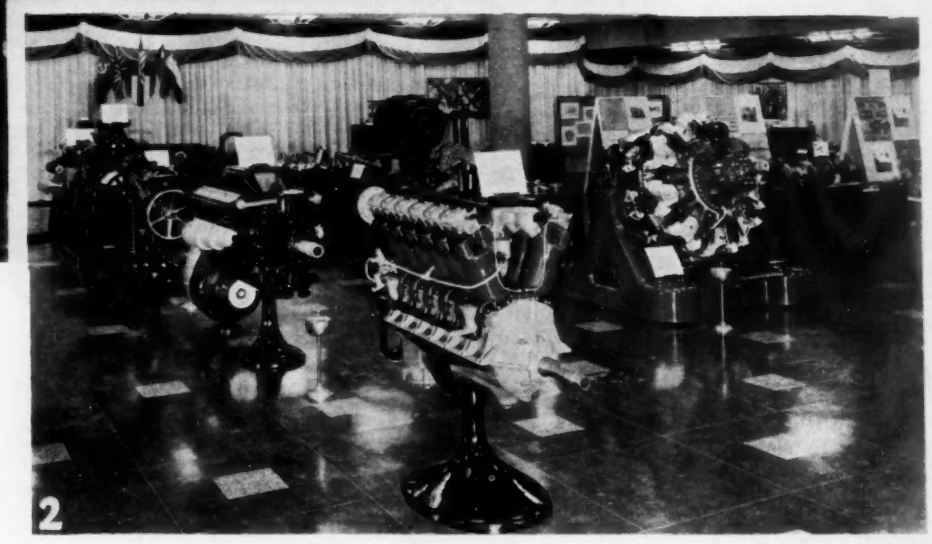
The effect of restrictions in the oil supply and delivery lines was analyzed and means of remedying them were then dis-



Members of the National Inventors Council and other engineers gathered before the huge Ford bomber cross-country trailer on exhibit in front of Rackham Educational Memorial Building during the SAE Detroit Section – ESD Meeting on War Production of Aircraft

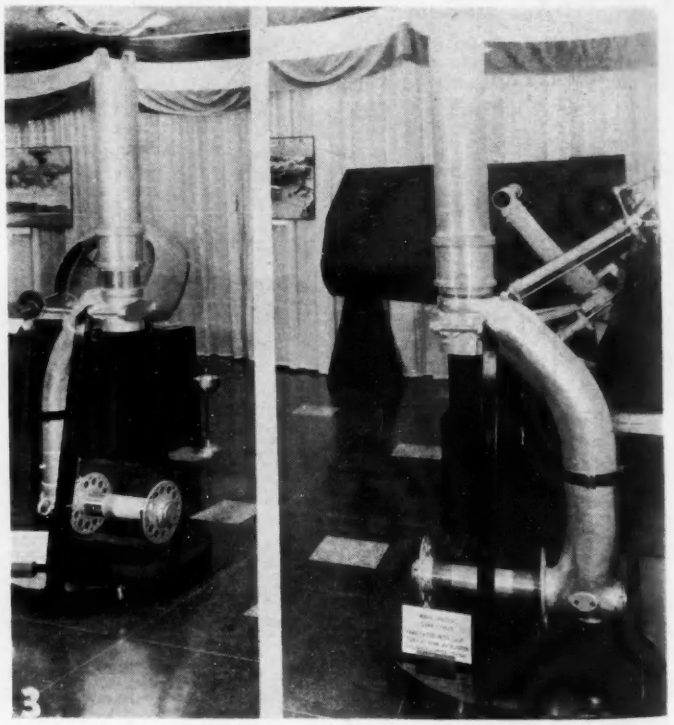
FORD EXHIBIT





1. Aircraft parts, latest aircraft and tank engines and historic aviation powerplants shown side by side in the main banquet hall. This display shows technical improvements in manufacturing, metallurgy, and design "in the making," and others recently approved for incorporation in American war equipment. Included here in the foreground is the Wright No. 3 engine of 1904. Castings, forgings and spot-welded stampings also are in the exhibit

2. In the foreground, liquid-cooled engines; in the background, aircooled engines. The liquid-cooled engines are: (left to right starting at the rear) captured German Daimler-Benz airplane engine, new Ford 8-cyl tank engine, cutaway model of Ford experimental engine, 12-cyl experimental engine, and a Liberty engine built by Ford in 1917 (front). In the background (left to right), parts of a disassembled Japanese airplane engine shot down by American forces, and the modern Pratt & Whitney airplane engine being manufactured at the Ford River Rouge plant



3. Two bomber landing gear struts and axles, the old (left) and the new. The former method required fabrication and assembly of tubular parts and forgings, with much more machine work than is required in the new method. Cast-steel parts, requiring less machining, are now used

THRILLS THOUSANDS

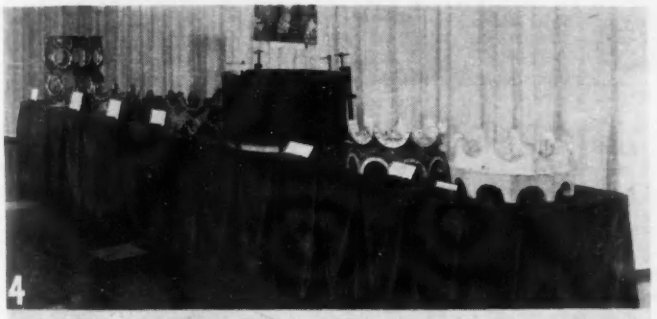
DEVELOPED at the request of the SAE and the ESD, an epic exhibit of Ford activities in connection with the war effort was a major feature of the meeting on War Production of Aircraft at the Rackham Educational Memorial Building in Detroit on June 8.

Special emphasis throughout was placed upon displaying in engineering detail how the application of improved methods of manufacture is able to decrease weight and reduce manufacturing time.

Parts of the exhibit are shown in the accompanying photographs.

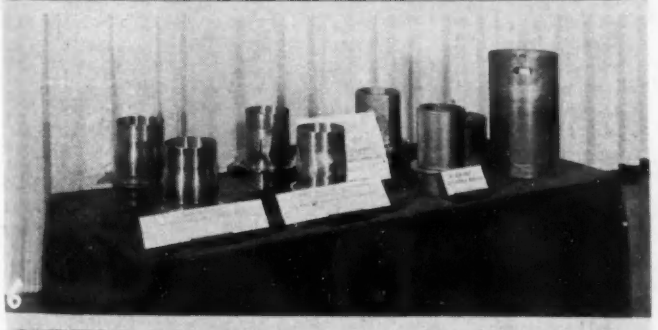
Henry Ford

Founder member of the SAE, through whose courtesy was made possible the memorable exhibit of automotive apparatus from Ford laboratories, shops, and museums.

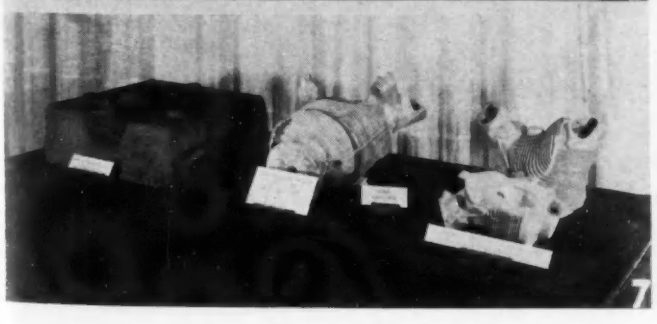


4. Complete series of comparative crankcase parts displayed for study. At the left are steel cast parts which are being developed to replace the forged aluminum parts shown at the right. Design improvements may make the steel parts even lighter than those of aluminum

5. These magnesium castings display to the foundry engineer methods of improving aircraft castings. The appendages, necessary for pouring the molten metal into the molds, have been reduced in number and complexity to speed casting and to reduce the amounts of metal that must be melted. Apparent, even to the layman, is the improvement shown in the comparison at the right



6. Tests have demonstrated within the past year that aircraft cylinder barrels can be cast successfully of steel, instead of being forged. The method reduces the use of metal, reduces machining, and saves time. Some centrifugally cast steel cylinders have withstood great pressures in hydrostatic tests



7. Foundry technique also has been improved in the casting of aluminum cylinder heads for aircraft engines. Samples here include a green sand mold, used to cast an airplane cylinder head, as displayed alongside the mold

(*Concluded from page 43*)

cussed. Case histories of engine-bearing failures due to lack of oil were reviewed and the specific remedies outlined.

The presentation closed with a plea for close cooperation between engine and plane designers so that all the factors involved would be taken into consideration. This would eliminate many lubrication difficulties which develop from the installation of the engine in the plane, even though such problems were to be expected.

Discussion of the Dolza and Karcher papers brought a request for amplification of the description of the return system. In response, the authors stated that the back pressure on a scavenge system is just as serious from a restricted outlet system as it is from inlet restrictions. "We have now set up," it was stated, "maximum allowable inlet suction values. 'Streamline' pipe fitting should be used in all cases."

The authors said they had no information as to the effect of oil types. "Throughout our own tests," they reported, "we have used our own oil and at no time saw any need for making any tests with various kinds. We do not believe this to be an important factor. What we have to contend with is a mechanical mixture of air and oil, and it has to be considered as such. De-aeration involves a time element."

Questioned as to whether or not the pump design as stated is accurate enough to prevent back flow, the authors said that a check valve is necessary, but that its pressure should be kept low – around 2 psi.

A question as to how the amount of aeration is checked, brought the response that a sample of oil is taken in a measuring glass and note made of the decrease in volume after it stands for a while. The best method, however, in the opinion of the authors, is to check the reduction in outlet flow versus inlet.

No real information is available at this time about the relative merits of the British as opposed to the U. S. Air Forces methods, the authors said, but added that they are now making tests and expect some results soon.

One discusser emphasized that the addition of air to the oil decreases the specific heat of the oil – and that this, in turn, decreases the effectiveness of the oil cooler.

Japanese Engine Paper Discussed

Presented at the afternoon session, the paper by W. G. Ovens, Wright Aeronautical Corp., on design features of the Mitsubishi Kinsei engine is printed in full in the Transactions Section of this issue (pp. 253-266).

Discussion of the Jap engine described by Mr. Ovens brought out a general desire to appraise the engine only on the basis of engineering facts – to "give the devil his due" for well-engineered features, as well as to point out inferior design.

"Examination of this engine clearly shows that we should respect the enemy – this is no papier-mache machine," one aircraft-engine man emphasized. "The bearings are particularly good, as is the plating on the piston rings." On the other hand, he pointed out, an erratic condition is indicated; some parts are well designed, whereas others are crudely made. He suggested that this condition seemed to indicate that the work was done in different plants, not all of which are maintaining the same standards of workmanship.

Asked why the engine had no vibration damper by another discusser, Mr. Ovens replied: "We wish that we knew; no information is available on this point."

To a question concerning the markings of various parts, Mr. Ovens reported that "some of these markings are obviously arabic numerals, possibly designating parts numbers. We were able to identify two of the hieroglyphics as indicating front and back, for assembly purposes.

One of the 15 SAE Aircraft-Engine Standards Committees In Action

Committee E-9, Preservation of Engines, whose task is to develop a group of standards to augment those already approved and issued on the extremely important subject of preventing corrosion of aircraft engines and parts in storage and shipping to all parts of the world under the most adverse conditions of warfare

The Committee is indebted to the Army and Navy, represented by Capt. W. L. Hardy, standing, and Lt.-Com. A. B. Scoles, seated at the left. Representing the government, these officers have presented the Navy and Army viewpoint, and have likewise reviewed first hand the views and experiences of the industry. They kept the committee informed of world-wide military requirements, and have put at its disposal reports which have been of great assistance in developing these standards **(See "SAE Aircraft-Engine Committees Report Progress," p. 28)**

(Left to right) Lt.-Com. A. B. Scoles, Naval Aircraft Factory; H. E. Todd, Pratt & Whitney Aircraft; L. J. May, Allison Division, General Motors Corp.; (standing) Capt. W. L. Hardy, U. S. Air Forces; and R. B. Stevenson, Davison Chemical Corp.; M. H. Young, Wright Aeronautical Corp.; A. P. Ayers, Jr., Pratt & Whitney Aircraft; (standing) B. L. Sharon, Lycoming Division, The Aviation Corp.; E. W. Rentz, Jr., SAE headquarters staff; R. L. Heath, Allison Division, General Motors Corp.; Ensign D. R. Weedon, Jr., Naval Aircraft Factory; and J. H. Bowen, Jr., Naval Aircraft Factory

Says RAF Defeat of Luftwaffe Shows Potency of Quality 'Tools'

▪ Canadian

SUPERIOR morale, superior training, and superior equipment of the Royal Air Force defeated the vastly superior numbers of the Nazi Luftwaffe in the aerial battle of Britain, SAE Past President W. J. Davidson, told the 200 members and guests of the Canadian Section at the May 20 meeting. The morale of the English-speaking people is peerless, he added, and the training of their troops is for the most part well conceived and executed. It is, therefore, our obligation, he declared, to see that the 'tools' with which we provide our fighting men in all services are not only equal to those of the enemy but superior in both quality and quantity.

A good part of Mr. Davidson's talk, "Fundamentals Involved in the Design of Army Vehicles" was 'off the record.' He told, however, of his personal participation as general manager, Automotive Ordnance Section, General Motors Corp., in investigating the suitability of the 'tools' being provided the fighting forces by the automotive industry.

Col. R. S. McLaughlin, dean of Canadian members of the SAE, president, General Motors of Canada, Ltd., and a vice president, General Motors Corp., was host for the evening. Retiring Chairman R. W. Richards was presented with a distinctive desk set as a token of the Section's appreciation of his work during the past year.

Cold Facts About Truck Rationing Bared at Final New York Meeting

■ *Metropolitan*

THE final session of the Metropolitan Section, May 14, opened on a somber note when J. F. Winchester, meetings chairman, stated that there are still many operators and fleet owners who have failed to comprehend the multitude of difficulties facing automotive transportation, and who have thereby not yet instituted programs which will permit them to operate their present equipment for the maximum length of service, with a minimum of delays due to inadequate servicing, parts failures, and similar deterrents.

The known demands on trucking are tremendous, he said, adding that severe additional demands will be imposed, particularly if our railroad or marine transportation breaks down in any way, or if possible enemy bombings rupture our established avenues for the transfer of goods. "There is only one job — we *must* keep our trucks operating," declared Mr. Winchester.

H. A. Martin, Bureau of Motor Carriers of the ICC, and truck rationing official for the metropolitan area, then followed, adding emphasis to the remarks of the first speaker. Truck rationing is rigid, he said, and by far the greater number of new-truck applications are turned down locally, and of those which eventually reach the WPB in Washington, an additional number become further casualties.

The speaker stressed that the larger trucks are especially few in number, and must be carefully husbanded for future needs. Smaller trucks are more plentiful, but no truck is allotted unless the need is absolutely imperative and proved without a doubt, and then only after all reasonable investigation has shown that no other existing equipment in the area is available for the task in hand, he warned. Mr. Martin closed by asking operators to submit their problems arising from the need for new trucks, but to do so honestly, carefully, and, it must be confessed, without too much optimism.

The all-important subject of gasoline rationing was then discussed by B. L. Ryback, from WPB Administrator Henderson's office at Washington. He minced no words, and made it plain that gasoline rationing is here to stay, will undoubtedly increase in area and scope, and is the one method which will help conserve existing tires for essential war transportation uses.

Said Mr. Ryback, "Skepticism is the greatest enemy of a successful rationing program. People just will not believe that, in this land of oil wells, conditions can conspire to make the continued use of gasoline difficult, if not impossible." The speaker stated that three methods are possible:

(1) Price regulation by the law of supply and demand,

(2) The "queue" system, first come — first served,

(3) Rationing.

The latter is the only fair and equitable system, Mr. Ryback said.

T. C. Smith, automotive engineer, American Telephone & Telegraph Co., then closed the meeting with some remarks about the future possibilities, both immediate and at greater distance, in view of the growing use of alternate materials, processes, and similar innovations. Research, accelerated greatly by the urgency of war, is ferreting out discoveries which are bound to have a revolutionary effect on future transportation, indeed on our entire future life, he said.

Final meeting arrangements were made by Robert H. Clark, T&M chairman.

CPT Is Source of Pilot Material for Air Forces

■ *Washington*

PRIVATE flying — once the orphan child of aviation — now is providing the Army and Navy Air Forces with an important source of pilot material, and with a wealth of information on light plane performance, Earl Southee, chief, Standards Division, Civilian Pilot Training Program, Civil Aeronautics Administration, told SAE members and guests, at the May 13 Washington Section meeting.

While the CPT promises only to "teach a man to fly," Mr. Southee said such instruction is giving young pilots practical basic training and a feel of the type of job for which they are best suited, before entering the U. S. armed air services. Specific information on light plane performance, taken from more than 20 years of experience, is aiding military officials in

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DOUGLAS ENGINEERS CHARTER A "MAINLINER" TO ATTEND SOUTHERN CALIFORNIA MEETING. Not even a critical tire situation on the West Coast could stop a determined Douglas Aircraft group from making the 100-mile trip from Los Angeles to San Diego, to be on hand for the May 8 aircraft meeting.

Hard-working SAE member William T. Bell headed up the group which contacted Western Air Lines, lined up a "Mainliner" and obtained permission from the Army to fly by night. This is the first recorded case in which such permission has been granted to civilians. The normal three-hour trip was made in 40 min. Considerable excitement was afforded on the return trip when searchlight beams from strategically located anti-aircraft batteries followed the plane across the sky.

SAE members are indicated in the before-flight picture (below) taken at the Los Angeles Municipal Airport. Left to right are: Captain Cerveny, Stewardess B. Small, Co-Pilot Caward, R. C. Leeds, H. M. Campbell, J. M. Howard, C. H. Hughes, R. I. Branning, Jr. (J '41), J. C. Londelius (A '41), J. Abert, W. G. Bell, W. T. Bell (J '40), K. Appleton, and R. Thompson. Kneeling, left to right are: C. Farrar, D. Cressey, L. A. Wood, R. Bergan, R. Matheson, P. H. Thompson (M '41), M. Swensson (M '40), T. D. MacGregor (J '35), E. Winkler, and E. Zanon.

determining how to use light planes in reconnaissance or supply service, Mr. Southee declared. He believes each branch of the armed forces – ordnance, field artillery, quartermaster, and similar corps – should have its own light planes for specific duties, just as these units have their own autos. A majority of the 16,000 registered U. S. light planes stand ready to transport military personnel, or to deliver freight, he said.

Two thousand three hundred instructors, including 50 women, who Mr. Southee intimated are as good instructors as men, are used to handle the Civilian Pilot Training Program. A great network of 600 colleges, ground schools, and airports offer courses in flight and ground instruction, he said.

In 1938, the CPT was started to reduce the high frequency of accidents occurring in non-scheduled aviation at that time, the engineers were told. Since then, insurance premiums have dropped to a minimum. Now private flying is looked upon with respect by the Army and Navy Air Forces, and has become an accepted part of community life, Mr. Southee declared.

Glider pilots are greatly in demand today, and there is particular need for the development of an enlarged glider unit as a striking arm of our air force, Mr. Southee said. There is a big job to be done in this field, he declared, and the CPT stands ready to assist in glider pilot training.

Says Versatile Alloy Formulas Keep Speed Steel Quality High

■ *Buffalo*

NEW high-speed steel formulas have been developed to meet war material emergencies and still maintain good performance, J. P. Gill, metallurgist, Vanadium Alloys Steel Co., told engineers at a combined meeting of the SAE Buffalo Section and the Buffalo-Niagara Section of the American Society of Tool Engineers, held in Buffalo, May 21.

Mr. Gill told of various improvements which have been made in tool steels by addition of tungsten, chromium, vanadium, cobalt, and similar alloying materials which have resulted in greatly increased production and tool life.

Describing the suitability of various tool steels for different types of work, Mr. Gill emphasized the distinction between work stock which gives a continuous chip and work stock that gives a discontinuous chip. He also pointed out the difference between the jobs where a heavy cut is taken and jobs where a "chaser" cut is taken, such as in making dies, and fine finishes.

In a continuous chip cut, the point of the tool does little work, Mr. Gill said, but a crater may form on the top of the tool, hence hardness and low friction are important. A brittle-chip cut calls for toughness at the point, he said, while regular lathe work requires hardness in the tool but not especial toughness. On the other hand, he said, fine-pointed tools for taps and dies require great toughness in the steel.

Increasing the carbon content in a steel increases the hardness at the expense of producing brittleness, he said, adding, however, that a judicious use of alloying materials sometimes makes it possible to retain both qualities.

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Flying Schools Must Redouble Capacity, Engineers Told

■ *Northern California*

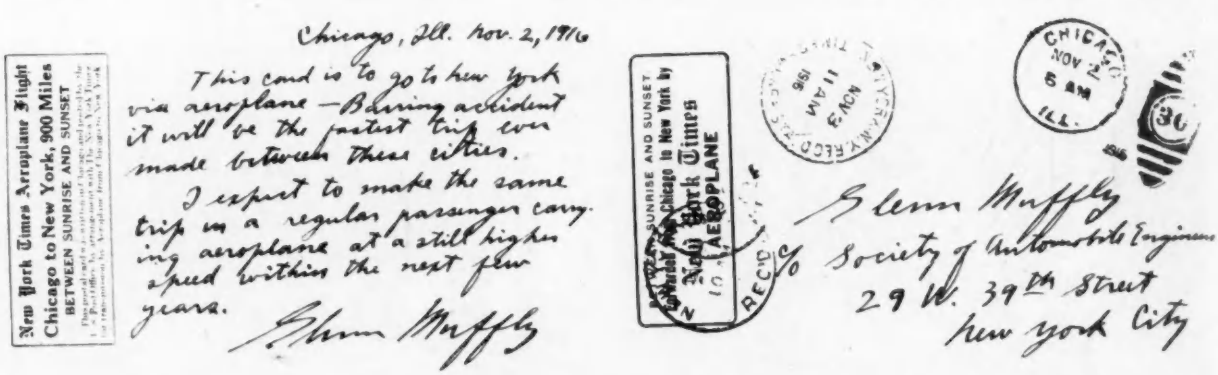
THE effect of the war on ground and flying school courses throughout the country, and a new technique in building aircraft engines were subjects discussed at the May 12 meeting of the Northern California Section by T. Lee, Jr., Boeing School of Aeronautics, and R. W. Hodge, respectively.

Mr. Hodge spoke on the method of fabrication used in making Taylor aircraft engines, in which parts are joined by "oven-brazing." The simplicity and speed with which fabricated engines can be constructed, he said, opens the way to true aircraft engine mass-production.

Every flying and ground course school in the country has doubled its capacity and must double it several times more, if the present flight training requirements are to be met, Mr. Lee stated. Compliance with every "executive wish" is the only way to avoid the government's taking over all private schools and giving the orders, he declared.

Since it takes six to eight men at overhaul bases to keep each plane in the air,

ELMER DAVIS, NEW WAR INFORMATION CHIEF, MANAGED RECORD 1916 FLIGHT



ON Nov. 3, 1916, the postal card (shown above) was received in the SAE headquarters. At that time the name was "Society of Automobile Engineers." It commemorated the fastest flight made up to that time from Chicago to New York, the 900-mile route being covered between sunrise and sunset. Elmer Davis, of radio news fame, then with the *New York Times*, managed the flight. Glenn Muffly, chairman for the committee acting for the Aero Club of Illinois in checking the pilot out at Chicago, addressed the postal card to himself at the New York Society address. When it was received at this end, the late Coker Clarkson, then secretary and general manager of the SAE, returned the original to him. We reprint a photostat copy

a review of airplane production estimates shows the tremendous size of the training job to be done, Mr. Lee said. The Navy trains its own men entirely in Navy schools, while the Army uses its own schools plus private commercial schools for primary and basic instruction, he said. This use of commercial schools allows the Army to handle a greater number of advanced trainees at their training centers, Mr. Lee explained.

The Civil Pilot Training program under Civil Aeronautics Authority is turning out men with good basic training, he said, as are the various commercial air lines who now train their own men in order to take care of increased Army freight transport operations. Another Army training program is handled by the overhaul depots who send men to commercial schools, while still other men are assigned to certain state and city schools for training, Mr. Lee stated.

Within one year's time and in 250 flying hours, a student can satisfactorily handle a flying fortress, said Mr. Lee, adding that a student pilot today is three times as far advanced in the same length of time, as was a World War I student pilot. However, a much longer time is required to train mechanics to the same level of proficiency than is required for pilots, he said. There are some training accidents, but in the short time available a certain number cannot be avoided, Mr. Lee stated. He concluded his talk by predicting an extremely great increase in the amount of freight and number of passengers handled in peacetime operation.

Official Navy pictures of the bombing of the Marshall and Gilbert islands, and a movie entitled "Sailors With Wings," completed the program.

The presence of 180 members and guests attested to the interest of this meeting, which was arranged by SAE Aeronautics Vice Chairman William V. Hanley, Standard Oil Co. of Calif.

Ordnance Expert Praises New U.S. War Weapons

■ *Milwaukee*

"WHEN the final chapter of this war is written, American industry will be given due credit for its part in preserving this nation," Brig.-Gen. G. M. Barnes, assistant chief of industrial research and engineering, U. S. Army, told a large engineering audience at the June 4 meeting of the Milwaukee post of the Army Ordnance Association. SAE Milwaukee Section members were invited to attend this association-sponsored meeting, and turned out in large numbers.

The greatest and most up-to-date war materials in the world are pouring from American plants, Gen. Barnes said, and the American people can be reassured of the productive might of this nation. An ever-increasing flow of these weapons is reaching the United Nations' forces in the field, he said, building the necessary resources to wage a successful counter-offensive.

Describing several war weapons which are being made in the Milwaukee area, as the highest types used by the Army today, Gen. Barnes gave particular attention to a new howitzer carriage being manufactured by the Bucyrus-Erie Co. of South Milwaukee. "This is one of the finest pieces of ordnance ever to be tested on our proving grounds," he declared.

Lt.-Col. A. Codd, executive vice president of the Army Ordnance Association, stressed the importance of maintaining military preparedness.

"It is the solemn obligation of every one of us to see that the cost in blood, men, and money will not have to be met again," he said. "Next to victory, our greatest obligation is making certain that we will remain strong. He who says that after this war we can forget our armaments must meet with the opposition of every true American."

F. A. Preston, civilian chief of the Chicago Ordnance district, which includes Wisconsin, said that this district has been awarded more than $2,500,000,000 in war work. More than $700,000,000 has been let to industries in the Milwaukee area – a volume which, he said, is equalled by no other city of comparable size.

SAE Diesel Group Plays Big Part in ASME Peoria Power Conference

TO improve the efficiency of America's diesel-powered fighting craft on land, in the air, and under and over the sea, approximately 500 diesel engineers from the SAE and the ASME united to stage a determined assault on stubborn diesel problems at the Hotel Pere Marquette, Peoria, Ill., on June 17-19, for the ASME 15th National Oil and Gas Power Conference. The SAE Diesel-Engine Activity, under the direction of H. L. Knudsen, SAE vice president representing Diesel-Engine Engineering, and G. C. Wilson, meetings chairman, Diesel-Engine Activity, cooperated with the ASME Oil and Gas Power Division in presenting the Conference.

The contribution of the SAE Diesel-Engine Activity to the Conference program featured a brilliant nine-paper symposium on oil control in high-speed automotive engines that covered the field like a snowstorm, and two penetrating papers presented at a joint ASME-SAE Session on Engines and Combustion – one on the effect of diesel fuel on exhaust smoke and odor, and another on the positive-displacement supercharger. All eleven papers, which were scheduled originally for the ruled-out 1942 SAE Summer Meeting, were debated vigorously.

These SAE features were largely responsible for the smashing attendance of close to 500 – a full 100% greater than expectations – which strained facilities to the limit. In the case of the SAE Oil-Control Symposium, only quick emergency action saved close to 100 from being shut out for lack of space. Within ten minutes the entire attendance of the symposium literally picked up their chairs and moved down to a larger room.

Other events on the crowded three-day program included technical sessions on Engine Design and Powerplants, and a Round-table on Operation and Maintenance under Wartime Conditions. A proving ground demonstration of modern diesel-powered earth-moving equipment was held on the last afternoon. More than 30 manufacturers showed their wares in an equipment and scientific exhibit that attracted hundreds daily.

The stirring down-to-earth address: "This Business of War," by Col. Willard Chevalier, publisher, *Business Week*, and vice president, McGraw-Hill Publishing Co., featured the informal banquet held on June 18, at which L. J. Fletcher, Caterpillar Tractor Co., served as toastmaster. Social events included an opening ASME-SAE luncheon on the first day, a get-acquainted buffet supper in "Gay-Nineties" atmosphere at which barbershop quartets vied with each other, and a concluding old-style Illinois fish fry on the last evening.

SAE members participating in parts of the program other than those contributed directly by the SAE included O. A. Leut-

Prominent at Banquet

(Left to right) L. B. Neumiller, president, Caterpillar Tractor Co.; Col. Willard Chevalier, publisher of *Business Week* and vice president McGraw-Hill Publishing Co. (principal speaker); and L. J. Fletcher, Caterpillar Tractor Co. (toastmaster)

wiler, University of Illinois, co-chairman of the Session on Engine Design; Raymond W. Young, who presented his paper "The Mercedes-Benz Aircraft Engine" at the same session; Lee Schneitter, Ebasco Services, Inc., and B. V. E. Nordberg, Nordberg Mfg. Co., chairman and co-chairman respectively of the Session on Powerplants; W. A. Parrish, Superior Engine Division, National Supply Co., co-chairman of the Roundtable on Operation and Maintenance under Wartime Conditions in which Mr. Schneitter and R. Tom Sawyer, American Locomotive Co., participated; and Prof. P. H. Schweitzer, The Pennsylvania State College, who presented a paper on "Excess Air and BMEP," at the joint ASME-SAE Session on Engines and Combustion.

Following are digests and summaries of discussion of the eleven papers contributed by the SAE Diesel-Engine Activity to the program of the Conference:

SAE SYMPOSIUM: *The Control of Lubricating-Oil Consumption in High-Speed Diesel Engines.*

Chairman, H. L. Knudsen

Symposium Leader, Max Roensch

For a good many years now, Mr. Roensch explained in an introductory outline of the purpose of the symposium, the problem of oil control in diesel engines has been tossed back and forth among the engine, piston-ring, piston, and oil engineers, with the result that it is still far from solved. "We are bringing specialists on each of these four phases of the problem together in this symposium," he pointed out, "so that they can shoot directly at each other and have a chance to answer back." In addition to covering the four phases just mentioned, he concluded, the program is broken down further to cover the various types of high-speed diesel engines.

The Engine

Piston Rings and Oil Control in Two-Cycle High-Output Diesel Engines — F. G. SHOEMAKER and REX ALLBRIGHT, Detroit Diesel Engine Division, General Motors Corp.

(Presented by Mr. Allbright)

THE problem of oil control in the uniflow two-cycle diesel engine is different from that of the four-cycle engine, these authors explained, primarily because of the differences in valve arrangement. In the two-cycle valve arrangement, they pointed out, the oil must be controlled below the air intake ports. Any excessive oil on the portion of the piston which passes the ports will move through the ports, into the air box, and either be smeared on the compression rings or be carried into the cylinder and burned. For this reason, they explained, the oil control rings are located near the bottom of the piston so that they travel nearly to, but not past, the air intake ports.

In a concluding summary the authors gave the following points as of primary importance in the consideration of the problem of piston rings and oil control in two-cycle diesel engines:

1. The piston skirt and compression rings should be lubricated sparingly to avoid excessive deposits.
2. Oil must be controlled below the air intake ports.
3. The piston-pin hole must be closed off to keep oil from flooding the piston skirt above the oil rings.
4. The piston skirt and compression rings should carry their lubricant with them.
5. Oil rings should be well vented and have unit pressures high enough to control a large amount of oil.
6. Clean air flowing past the oil rings aids in controlling the oil, and in keeping the oil passages clear.

Control of Oil Consumption in the High-Speed Four-Cycle Automotive Diesel Engine — A. T. STAHL, Mack Mfg. Corp. - International Plainfield Motor Co.

(Presented by R. V. Firth)

THREE groups share the burden of study and work required to accomplish proper control of oil consumption in a particular four-cycle high-speed automotive diesel engine: the designers, the experimental or development people, and the service or field organization, in Mr. Stahl's opinion.

Discussing first the designer's responsibility, he emphasized that the greatest single factor in successful control of oil consumption is the cylinder barrel. "When it remains a true cylinder," he pointed out, "little difficulty is experienced, but it becomes a real source of trouble, remaining forever a disturbing or destroying factor should it be subject to fixed or variable distortion."

Under "variable" distortion of the barrel, he continued, the common disturbing possibilities are the cooling system and the combustion chamber. Each new block or head design, he pointed out, includes changes of water space and passages sufficient to require re-study of water flow and heat transfer. It is not safe, he warned, to assume that water flow follows the design pattern, and the system should be checked by the tedious process of thermocouple investigation.

Speaking of the responsibility of the experimental and development group, he said that it is possible for this group quickly to determine if the engine will require alteration to affect its oil-consuming tendencies by obtaining answers to a few questions pertaining to the absolute consumption rate at the governed speed; the smoothness of the change of consumption rate with speed; probable consumption in terms of miles per quart; and ring arrangement. A series of full-scale tests is the first requirement in preparing for answers to these questions, he said.

The service engineer, Mr. Stahl explained, is the cushion between the design and development engineers and the fellow who wants "to meet the so and so who designed this thing!" If the evidence is against the design and development groups, and such complaints are justified, he pointed out, the service engineer automatically assumes a share of the responsibility for the necessary experimental investigations and the design alteration that might follow.

Control of Oil Consumption in Four-Cycle Diesel Aircooled Engne — W. M. McLAURIN, Guiberson Diesel Engine Co.

AN experimental basis for the establishment of proper oil control is two-sided in so far as it applies to oil consumption, Mr. McLaurin believes. The oil consumption may be made so low or drastic as to be erratic in manufacture, and unstable or deficient over protracted periods of operation. On the other hand, at full load, reasonable control of oil consumption is desirable not only as a matter of economy

Participants in SAE Symposium

(Seated left to right) Jack O. Holls, American Hammered Piston Ring Division, Koppers Co.; P. B. Jackson, Aluminum Co. of America; W. M. McLaurin, Guiberson Diesel Engine Co.; and Rex Allbright, Detroit Diesel Engine Division, General Motors Corp.

(Standing left to right) C. G. A. Rosen, Caterpillar Tractor Co.; Max Roensch, Chrysler Corp (symposium leader); R. V. D. Firth, Mack Mfg. Corp.; Paul S. Lane, Muskegon Piston Ring Co.; and Stuart Nixon, Sealed Power Corp.

(Symposium participants not shown in photograph: F. Glen Shoemaker, Detroit Diesel Engine Division, General Motors Corp.; A. T. Stahl, Mack Mfg. Corp.; T. C. Jarrett, American Hammered Piston Ring Division, Koppers Co.; Macy O. Teetor and A. M. Brenneke, The Perfect Circle Co.; and Fred Zollner, Zollner Machine Works)

Cooperating ASME and SAE Officers

(Left to right) W. L. H. Doyle, chairman, Executive Committee, ASME Oil and Gas Power Division; G. C. Wilson, meetings chairman, SAE Diesel-Engine Activity; C. G. A. Rosen, chairman, ASME Central-Illinois Section and vice chairman, Peoria District, SAE Chicago Section; H. L. Knudsen, SAE vice president representing Diesel-Engine Engineering; F. L. Meyer, chairman, ASME National Conference General Arrangements Committee; and L. N. Rowley, secretary, Executive Committee, ASME Oil and Gas Power Division

but to avoid disturbing the normal combustion process.

Oil-consumption figures for the Model T-1020 9-cyl, 5⅛ by 5½-in. engine of 1020 cu in. displacement, rated 250 hp at 2200 rpm, were reported by Mr. McLaurin in lb per bhp-hr as follows:

0.009	at	1800 rpm
0.013	at	2000 rpm
0.020	at	2200 rpm

Ring sticking and piston lacquering, he continued, are either absent or very rarely encountered at the present time; they seem to be best controlled by means of the lubricating oil itself.

In further discussion of the engine's system of oil control Mr. McLaurin brought out the following:

Pressure lubrication is applied through a hollow crankshaft to the articulating rod bearings. Leakage or spray from these bearings provides the principal lubrication to the cylinder walls and pistons.

The cylinder barrel or sleeve is ground and honed with a round straight bore to a 6-10 micro-in. surface finish before it is assembled with the cylinder head. Below a 6 micro-in. finish, there is a noticeable increase in oil consumption. Although there is no noticeable change in oil consumption at 15 micro-in., a longer run-in period is desirable.

Piston Rings

Engineering Piston Rings for High-Speed Diesels **– PAUL S. LANE, Muskegon Piston Ring Co., and STUART NIXON, Sealed Power Corp.**
(Presented by Mr. Nixon)

RING sticking, broken rings, and excessive wear, the most usual sources of complaint on high-speed diesel engines, have been improved greatly in many cases by using some of the excellent oils now offered by many oil companies, Messrs. Lane and Nixon averred in a summary of their recommendations to improve the performance of diesel piston rings.

In the case of broken rings, they pointed out, breaks at the back are usually the result of excessive ring loading or poor design. Tip or end breakage (commonly called fatigue breakage), assuming clearances are correct, is usually the result of flutter or ring vibrations. One of the causes of this flutter, they explained, is the high pressure rise during combustion, particularly in a cold engine. Change of ring proportions, even use of higher tensions, they reported, often will eliminate this complaint.

Checking and correction of injection timing often will stop the breakage. An engine running at uniform speed and load has far less breakage, they pointed out, than has one operating under conditions of frequent starting and stopping. Rings do not break up all at once, they emphasized; fracturing of rings into small pieces is only the result of running after the initial failure.

Summarizing their remarks on ring wear, the authors reported:

"Ring wear normally increases with speed. Excessive wear is, in most cases, a result of dirt getting into the engine and, where particularly dusty conditions are encountered, frequent drainage and proper maintenance of air and oil filters retard wear. Engine maintenance, including the fuel and injection system, is important. In most cases, maximum oil economy and minimum wear do not go hand in hand. Usually, it is more economical to drain the oil at proper intervals.

"When conditions are unusually severe, the application of surface-treated, hard-plated, or metal insert rings frequently lengthens the period between overhauls. Initial scuffing and break-in wear are factors of cylinder finish and ring surfaces, together with other variables requiring special consideration for each type of engine."

Recent Developments in Piston Rings for High-Speed Diesels **– J. O. HOLLS and T. C. JARRETT, American Hammered Piston-Ring Division, Koppers Co. (Presented by Mr. Holls.)**

THE most recent successful improvement to piston rings, the authors revealed, is an electroplated deposit of hard porous chromium plate on the OD surface of the ring. This development follows the Van der Horst method of hard porous chromium plating which has been used successfully in cylinder liners. They pointed out that this deposit is many times harder than the piston ring, and many times thicker and harder than the cylinder surface against which it operates.

The porous chromium plated ring, they explained, has the great advantage of being able to seat itself far more quickly than does the plain cast-iron ring; it also causes the other plain rings below it to seat faster than normally is the case when all compression rings are of cast iron.

In a further review of the advantages of this development, they brought out that the presence of the porous chromium plated ring does not necessitate ring rearrangement or other general changes in ring specification; that such rings are not as susceptible to

engine characteristics, such as speeds and pressures, as are other rings; and that their ability to resist wear is "phenomenal," increasing the life of the rings three to five times in some cases.

Prefacing their review of developments in surface treatment of piston rings, the authors classified surface coatings as those achieved by oxidation and those chemically etched. Since the depth of penetration of these coatings is very slight, they contended, their value in terms of ring life is not great enough to be considered satisfactory in many cases.

Surface treatment by material combinations, such as obtained by bronze inserts and grooves partially filled with tin, they said, increase ring life over that of rings only surface-coated. Flash types of electroplated surface, such as tin plating, they pointed out, are shallow, like the chemically treated surfaces, and consequently are subject to limitations.

Importance of Compression Rings in Controlling Oil Consumption – MACY O. TEETOR, The Perfect Circle Co.

(Presented by A. M. Brenneke)

ALTHOUGH compression rings are primarily sealing rings, they must also control some oil consumption, Mr. Teetor emphasized. Oil rings, he said, prevent excessive quantities of oil from reaching the compression rings, but the amount controlled affects the sealing and lubrication of the compression rings. The volume of oil to be controlled largely determines the type of oil ring to be used. "Therefore," he concluded, "it is better to consider all the rings on a piston as operating cooperatively rather than to assume that each type has a separate and distinct function independent of the others . . . Because of individual engine characteristics, the most satisfactory combination of piston rings can best be selected experimentally . . . Considerable testing is sometimes necessary."

Oil consumption can be maintained at a surprisingly low figure, he believes, as long as the conditions that cause scuffing are kept under control; otherwise, oil consumption will become erratic or consistently excessive. When scuffing is caused by piston rings, he pointed out, it usually is started by the top ring which "operates in the highest temperature zone of the cylinder, under the greatest pressure, in the part of the cylinder that has the greatest distortion, receives the least lubrication, and is blasted with any dust that enters the intake."

Speaking of temperatures, Mr. Teetor reported that 400F is to be expected, and 600F is not uncommon for cylinder surfaces. At excessive temperatures, he pointed out, compression rings lose their tension and shape characteristics and, as a result, some of their ability to follow a cylinder wall.

Scuffing problems created by excessive temperatures and pressures may be attacked in many ways, he concluded, one of them being to use piston rings of the most suitable material. Referring to heat stability, he reported that piston-ring materials vary considerably. Cast iron is among the best, he said, and some alloyed cast irons have proved to be very good, as has nitrided cast iron, but other characteristics of this latter material have not yet been proved satisfactory. A material having satisfactory heat stability, he pointed out, does not necessarily have sufficient load-carrying capacity, adding that cast iron, and especially, alloyed cast iron still seemed best in this important property.

"The question of what is the best piston-ring material," he emphasized, "cannot be answered without taking into consideration the material of the cylinder on which it is to operate."

Pistons

Control of Oil Consumption in the High-Speed Four-Cycle Automotive Diesel Engine – F. B. JACKSON, Aluminum Co. of America.

"WITH the trend toward supercharging, higher speeds, and generally higher ratings," Mr. Jackson predicted, "it may well be that oil cooling of pistons of high-speed engines will find increasing usefulness. This available solution to the piston problem, combined with careful and effective cylinder cooling and distortion control, will solve two of the problems of high output." Reviewing developments in oil cooling pistons of high-speed engines, Mr. Jackson said:

"Several methods have been used successfully. The easiest to provide is the so-called spray-cooled design, where oil is carried up through a drilled connecting rod, around the outside of the connecting-rod piston-pin bushing, and directed, usually by a nozzle, to the underside of the piston crown and ring belt. A copious flow of oil is necessary to make this system effective and, when provided, it reduces the piston temperatures below the ring-sticking range and below the varnish-forming stage.

"Another method consists of casting a steel or copper coil into the piston and circulating oil that is supplied through the connecting rod. This method, while not removing quite as much heat from the pistons, does effectively cool the ring belt, keeping compression rings free and allowing for somewhat closer piston fits.

"A third type has been described as 'slosh' cooling. Oil is introduced into a cavity under the piston crown and above the piston pin. An overflow, the opening of which is just under the bottom side of the piston crown, maintains a volume of oil in the cavity which is sloshed around by piston motion."

In his presentation, Mr. Jackson included a discussion of a piston design, the principal characteristic of which is low oil consumption, and a comparison of the three possible arrangements for oil control rings:

1. One above and one below the wristpin.
2. Two and, in some cases, three oil control rings above the piston pin.
3. All oil-control rings below the piston pin.

Solutions for Diesel Piston Problems – FRED ZOLLNER, Zollner Machine Works.

PISTONS that will operate satisfactorily for long periods without structural failure and without excessive varnish precipitation or ring sticking in either supercharged or unsupercharged diesel engines can be provided, Mr. Zollner summarized, by careful attention to: structural stability, adequate head and ring-belt section, adequate ring lands, ring-groove details, piston skirt contour *and especially* ring land clearance and contour. Should conditions become more severe in later design engines, he declared, oil cooling can be added.

If oil cooling is applied, he continued, the simplest method is to spray the oil directly inside the piston so as to register with the piston head and ring-belt areas. An important advantage of this arrangement, he said, is that it can be applied to a straight conduction piston without any alteration of piston design.

The development of the supercharged diesel engine, Mr. Zollner explained, increased the previous problems to such an extent that a very satisfactory piston for a non-supercharged engine was unsatisfactory for a supercharged engine. These difficulties, he reported, were due principally to piston-ring sticking, and this condition can be overcome successfully in the simple conduction piston along the following lines:

The diameter of the piston-ring lands should be developed carefully to provide substantially the same clearance as the effective clearance of the piston skirt at operating temperatures. These diameters should be cam ground if necessary and finished to precision tolerances. Where further refinement is necessary, any tendency toward ring sticking can be eliminated by using a keystone ring of deep-wall type in the top ring groove.

Lubricating Oil

Control of Lubricating Oil Consumption of High-Speed Diesel Engines as Affected by Lubricating Oil Composition – C. G. A. Rosen, Caterpillar Tractor Co.

"A LUBRICATING oil will have more effect on oil consumption as a result of its efficiency in maintaining a clean engine than as a result of any individual physical characteristic by which oils are now recognized," Mr. Rosen emphasized throughout his talk. The better detergent-type oils available today, when provided with suitable stability and used in properly designed engines, he continued, permit an oil consumption of one-half that formerly considered safe with straight mineral oils and will do so *over a far greater life cycle*.

Control of oil consumption during a reasonable engine life, Mr. Rosen pointed out, will depend on two provisions:

1. That proper control has been built initially into the engine by suitable rings, pistons, and cylinder surfaces.
2. That the oil behaves and is treated in such a fashion as to maintain in good mechanical condition those features of the design which control oil consumption.

Assuming that the first provision has been met, he continued, the composition of the oil should be such that it bears the main responsibility for the continued functioning of the piston and rings and performs the following functions:

1. It should keep all piston rings free and clean, allowing the compression rings to seal properly and the oil rings to scrape and move the surface oil back into the case with a minimum of difficulty.
2. The oil should form a minimum of carbonaceous deposits in the ring grooves and so protect the rings from being forced against the cylinder. When this carbon formation does occur, the ring involved eventually has to absorb a part of the thrust of the piston against the cylinder, which results in a high rate of wear.
3. The oil should keep ring and cylinder wear at a low level.
4. The oil should be able to carry high loading of the ring against the cylinder

without allowing scratching of the surfaces due to welding.

That property of the oil which directly affects consumption in the greatest degree, he said, is viscosity. He added that the choice of a viscosity grade has been made largely through experience, "though some tinge of superstition concerning it still seems to exist."

Discussion

Results of recent extensive tests on compounded and uncompounded oils used with various types of filters, presented at this session, threw new light on these controversial issues.

Correlation of field tests with laboratory tests on a compounded oil was reported by A. B. Culbertson, Shell Oil Co., Inc., the first to be called on by Symposium Leader Roensch.

The test was divided into two parts, Mr. Culbertson explained, reading from his prepared discussion of Mr. Rosen's paper: 11 engines were put under field test schedule similar to that recommended by the Caterpillar Tractor Co., being run for 11,000 hr. In addition, 26 other engines of the same make were supplied this oil and were kept under observation during this same period.

Comparing these test results with laboratory results of the same oil from the Caterpillar No. 1-A and No. 3 tests by means of slides, Mr. Culbertson concluded:

"Results of these tests prove that oils which pass the laboratory procedure do not give considerable amount of failure due to stuck rings, lacquer deposits or corrosion products."

Noting that cast iron is widely used as a piston-ring material because of its ability to adjust itself to changing surface conditions, Mr. Lane wondered whether the successful use of the "hard, vitrified, unyielding surface" of the chrome-plated piston rings, described by Mr. Holls, indicates that "we must throw out existing theories and start all over again." He inquired also whether the rounded edges of the chrome-plated rings didn't give increased oil consumption.

In reply, Mr. Holls explained that the seating of the rings is achieved through the "very porous skin surface," adding that the surface itself is "not hard." Referring to the radiused edges, he declared that oil consumption is not a problem; that increased unit pressure helps to keep it under control. Before calling on the next discusser Mr. Roensch contributed that the two top piston rings of a Mitsubishi Kinsei engine,* taken from a crashed Jap plane, were chrome plated, and that the Japs had done "a very good job of plating."

Advantages claimed for flexible-type oil rings in controlling oil consumption were reviewed by Paul E. Friend, Wilkening Mfg. Co., in prepared discussion.

"In this matter of oil control," Mr. Friend declared, "I like to see some positive means of controlling oil under all conditions with a really flexible oil ring, either expander type or self-expanding type, the ring to have a moderate amount of unit pressure of around 200 psi. Such a flexible-type oil ring can be used as a means of securing higher unit wall pressure, where more pressure is necessary for oil control, than can be produced in the conventional ring designs. "But primarily," he emphasized, "the flexibility of the ring is the characteristic that most recommends it; it is this flexibility that is useful in avoiding recurrent high oil consumption due to production intangibles."

Spirited and eloquent debate on long-mooted issues concerning filters and compounded lubricants was touched off at this point by Frank A. Suess, Continental Oil Co.

Mr. Suess reported the results of testing a compounded oil removed from an engine after six months' service with continuous filtration, using the Fuller's-earth type of filter. He contended that the filter removed 60% of the additives originally in the oil. From normal tests of physical properties – such as flash point, neutralization number, and so on – he said, the oil seemed to be O.K. But under the modified Underwood oxidation test, or similar test that predicts what will happen when the oil is exposed to exceedingly high temperatures such as are found in severe service overheating, it was discovered that the oil had lost its detergent and anti-oxidation properties.

"Although the oil after filtration will give results as good as or comparable to straight mineral oil, he concluded, the extraction of the additives robs the oil of the special characteristics that make it a heavy-duty oil."

* See pp. 253-266, Transactions Section, this issue: "Some Notes and Design Features of the Mitsubishi Kinsei Engine," by W. G. Ovens.

In rebuttal, Kurtiss P. Schenke, Briggs Clarifier Co., reported results of engine tests using a particular type of oil clarification with Fuller's-earth type of filter. This type of oil clarification, he contended, removes acids, gums, and resins – not only insolubles but solubles. It is particularly effective, he pointed out, in keeping a new engine clean so that rings, cylinders, and pistons will face each other smoothly, thus eliminating the possibility of excessive oil consumption and wear. He conceded that such filters do remove *some* acid compounds from *certain* oils but claimed that such removal "made them better oils."

Further experience with Fuller's-earth type of oil clarifiers was reported by G. C. Hazard, Socony-Vacuum Oil Co. After expressing his agreement with Mr. Suess that such filters remove additives from compounded oils, he added that "in a few hours they give them back, so you don't have to worry." He contended that additives are sometimes used "to cover up deficiencies of inferior oils."

Similar experience with compounded and uncompounded oils and Fuller's-earth filters, reported Dr. U. B. Bray, consultant, is the reason why he had abandoned the use of Fuller's-earth type filters for additive-type oils. "Use of straight mineral oil with a Fuller's-earth type filter is better than without the filter," he summarized, "but use of compounded oil with a cellulose-type filter is best."

R. W. Goodale, Standard Oil Co. of Calif., reviewed the advantages of compounded oils in his prepared discussion, emphasizing particularly their ability to prevent ring sticking, to inhibit oxidation, and to reduce wear to a minimum.

In summary, he contended that controlling oil consumption in high-speed diesel engines is a mutual problem between the engine and petroleum industries; and that maximum life of an engine cannot be accomplished without using oils that:

1. Have proper volatility;
2. Are properly compounded to produce high limiting adhesion temperature;
3. Have anti-ring-sticking properties;
4. Have low wear qualities;
5. Have high stability.

Successful experience with compounded oil in diesel-powered railroad streamliners was reported by L. W. Downey, Chicago, Rock Island, and Pacific Railway Co., to conclude the session. Ring sticking has been eliminated, he said, and rings now stand up for 100,000 miles. In this service, he explained, break-in periods are impossible.

ENGINES AND COMBUSTION
(Joint Session ASME-SAE)

Chairman, C. W. Good
Co-Chairman, A. J. Blackwood

(The following two papers with their discussion were the contribution of the SAE Diesel-Engine Activity.)

Effect of Diesel Fuel on Exhaust Smoke and Odor – R. S. WETMILLER, The Texas Co., and LT. L. E. ENDSLEY, JR., U. S. Army Engineers (formerly of The Texas Co.).
(Presented by Mr. Wetmiller)

"ALTHOUGH fuels may be chosen to give desired results along any selected lines of engine performance," these authors concluded, "it is not possible to obtain all desirable results with a single fuel, at least not without recourse to additives." Their presentation reported the results of an extensive program of laboratory investigation of diesel exhaust smoke and odor carried out on two popular automotive-type diesel engines.

"For example," they continued, "an increase in cetane number or volatility will reduce exhaust smoke, and an increase in cetane number will reduce exhaust odor. However, an increase in either of these fuel properties frequently is accompanied by decreased power and economy. The only present solution appears to be fuel selection on the basis of a compromise amongst the various factors involved. Proper interpretation of the engine performance characteristics most desired and consideration to the type and mechanical condition of the engine used should result in selection of fuels for utmost satisfaction. No doubt, future engine design will obviate the necessity for tailor-made fuels and precise maintenance practices."

A critical survey of several fleet operations and field tests conducted on a number

of buses, they said, confirmed reports that, although pronounced exhaust smoke and odor occur under full load, the most objectionable conditions were those occurring during idling, acceleration after idling and, occasionally, deceleration with the clutch engaged. From this finding and the results of the tests made, they concluded, "it appears that an increase in cetane number will produce a decided decrease in exhaust smoke by virtue of its ability to support combustion under adverse conditions of low output."

In an attempt to minimize the obnoxious smoke and odor from exhaust gases of diesel-powered vehicles, the authors explained in their introduction, numerous operators have resorted to kerosene-type fuels. While this expedient did result in a substantial reduction in exhaust smoke, they emphasized that it was accompanied by a pronounced loss in power and economy due to the lower available heating value on a volume basis.

In view of these shortcomings of both "normal" and kerosene-type fuels, they pointed out, the purpose of their investigation is to make available exact information as to the influence of individual fuel properties on engine performance as reflected by exhaust smoke and odor, power and economy.

Discussion

Taking issue with the authors' explanation – that cetane number was over-shadowed by gravity – of the one case where smoke increased with cetane number, Prof. P. H. Schweitzer, The Pennsylvania State College, contended that gravity may be only a secondary factor and that "two other fellows," namely volatility and viscosity, might have more to do with this anomalous behavior. He reported that in a number of tests made at Penn State he had found that, in some cases, smoke increased with cetane number, as well as with compression ratio, beyond a certain point.

In reply, Mr. Wetmiller emphasized that the tests in which it was found that exhaust smoke increased with cetane number, were made under wide-open accelerating conditions and that his results were meant to apply only to these conditions. He repeated that the analysis and correlation of these test results indicated that gravity was the controlling variable.

Answering a question from the floor on the correlation of smoke and odor, Mr. Wetmiller reported that kerosene-type fuel that decreased smoke seemed satisfactory as to odor. He told H. L. Knudsen, Cummins Engine Co., who suggested that sulfur dioxide may correlate with odor, as well as does aldehyde, that he did not believe the sulfur situation is as serious as it seems to some.

Results of diesel smoke tests using a high-speed camera were reported by Harry F. Bryan, International Harvester Co. In one test, he explained, all variables were held constant except the temperature of the precombustion chamber wall. At low temperatures of the precombustion chamber, he said, white smoke formed over the top of the piston and over the exhaust passages. As the precombustion-chamber temperature was increased, he continued, the white smoke turned to black. The smoke did not form, he explained, until after the inflammation had ceased and the temperature had dropped. He also reported that considerable work has been done by his company to determine the effect of the size of the spray drops, and that the results of this work had been very helpful in smoothing out combustion.

The question of whether different results would be obtained by testing fuels of the same physical properties but of different compositions was raised by L. W. Griffith, Shell Oil Co., Inc. In reply, Mr. Wetmiller explained that, in the tests reported in his paper, a number of fuels were tested that had close to the same, but not identical, physical properties, and that the differences in performance seemed to be explained on the basis of the difference in physical properties.

The Positive-Displacement Supercharger **– JOHN L. RYDE, McCulloch Engineering Co. (published in full, pp. 304-313 this issue).**

Discussion

The prepared discussion of J. E. Whitfield, General Machinery Corp., setting forth the salient points of the Whitfield blower, was read by E. S. Hall, Round Engine Patents, to lead off the discussion.

Mr. Ryde comments quite casually on the Lysholm and Whitfield blowers, Mr. Whitfield remarked, and their similarity in con-

struction to the Roots type, except for the use of special helical rotors and porting arrangements. However, he contended, the Whitfield blower cannot be dismissed quite so casually because it is very much unlike the Roots both in theory and design. The Roots blower, he explained, operates on the cross-flow principle while the Whitfield blower is of the screw type and operates on the axial-flow principle. Because of the considerable reduction in noise and torque variation made possible by this design, he contended, much higher operating speeds can be obtained.

As far as the manufacturing problem is concerned, Mr. Whitfield averred, most engineers will be surprised to learn that the rotors in the Whitfield blower are the most easily machined of all types, even including the straight two-lobe Roots type. The Whitfield blower, he concluded, is the result of about 10 years of experimental work, during which period every conceivable blower type was investigated.

A second prepared discussion, by H. F. Brinen, Young Radiator Co., dealing with supercharger intercoolers, was read at this point by G. J. Haislmaier of the same company. These intercoolers, Mr. Brinen explained, have been for marine use and have been water cooled, usually by sea water. The first requisite of an intercooler outside of its function as such, he pointed out, is that it be contained in a small package. Our intercoolers, he continued, utilize the tube-and-fin type surface, and it is therefore necessary that we use fairly small flat or round tubes closely spaced to obtain maximum cooling efficiency. Since the designer responsible for the plumbing of the installation invariably routes all water handled by the engine cooling pump through the intercooler jacket, the result is that quantity circulated is approximately five times that required properly to cool the air between supercharger and engine, and this arrangement results in extremely high tube velocities within the intercooler core. Curves were then displayed showing the effect of variations of water flow on three cores in common usage at the Young Radiator Co. The curves indicated the practical limit for tube velocities.

"We do not foresee successful intercooling of supercharged air on automotive radiator-cooled engines in the near future," Mr. Brinen concluded. "Some novel means unknown to us at the present time must first be devised."

"The case for the centrifugal supercharger is by no means a closed chapter," contended J. R. McDermet, Elliott Co. He pointed out that the German Daimler-Benz aircraft engine, discussed by Raymond W. Young at an early session of the meeting, was equipped with a centrifugal supercharger with a variable-speed drive. He reported that the Elliott Co. not only manufactures centrifugal superchargers, but is the American licensee for the Buchi turbocharger system, with multiple exhaust manifolding and scavenging features, and is also experimenting with positive-pressure superchargers.

"We feel that efficiency is pertinent," he concluded, "and becomes of greater importance on larger engines. We are working toward still higher efficiencies, increased speeds, and higher compressions in the interest of economizing on space and weight."

Replying first to Mr. Brinen, Mr. Ryde contended that his company had adopted the Roots type of rotor in the interests of maintaining tolerances and uniformity in production. The item of cost is also important, he added, reporting that the straight lobes of the Roots-type supercharger can be milled in 4 to 5 min. Answering Mr. McDermet, he conceded that the Roots blower is not the answer for all applications, but is the best type of supercharger for some applications. He also agreed that the centrifugal type is the more efficient but pointed out that the gearing required to obtain the high speeds raises the cost of this type if a uniform quality of workmanship is to be maintained.

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Diesel Engines in Aircraft Among Topics at Student Meeting

▪ Southern California

THE fuel weight advantage of the diesel engine in aircraft was one of the points raised in favor of powering our planes with such engines by S. C. Burton, Aero Industries Technical Institute, at the SAE annual student meeting sponsored by the Southern California Section, June 2. Also on the program were Norman C. Parrish, University of Southern California, who spoke on "Improvement of Crankcase Conditions," and John D. Waugh, Lockheed Overseas Corp., who discussed "Propeller Control and its Relation to Power in Aircraft Engines."

Mr. Burton emphasized advantages of using diesel fuel to reduce fire hazard. He also pointed out that more complete combustion of the diesel fuel results in a marked decrease of carbon monoxide in the exhaust gas. This permits simplification of cabin heaters, he said, since the exhaust type can be used safely. Other points in favor of diesel power, Mr. Burton gave as freedom from radio interference and elimination of the need for mixture controls or carburetor heaters.

Stating clearly that his paper was not a complete survey or complete solution for the crankcase difficulties of the service man, Mr. Parrish said it might "cause service men to consider what can be done about improving crankcase conditions to get a longer useful life out of the crankcase oil, rather than the usual frequent draining of the crankcase and the changing of the oil filter."

Two beneficial changes that can be made in the crankcase sludge conditions, Mr. Parrish said, are to clean and preheat the ventilating air and decrease the oil temperature. Lowering the oil temperature by placing the oil radiator in the air stream before the water radiator tends to improve the engine condition by raising temperature before it is recirculated through the engine, he said, adding that this arrangement should give a better heat balance of the engine.

Outlining the development of fixed-pitch and variable-pitch propellers, John D. Waugh said it would not be surprising to see propellers of 6, 8, or 10 blades in use on the monstrous powerplants of the future. Such powerplants Mr. Waugh envisioned as generating 5000 to 10,000 hp.

Big Western Automotive School Inspected by SAE Club Members

▪ SAE Club of Colorado

A TOUR through Opportunity School — one of the best-equipped automotive schools in the West — constituted the May 18 meeting of the SAE Club of Colorado. Graham Miller, principal, and V. H. England, superintendent of the Automotive Department, addressed the group on the student program, and conducted SAE members through the shops where students were operating machines and welding equipment.

The Thompson Products Company's picture, entitled "Streamlined," was shown to the group following the school inspection.

About SAE Members

(*Concluded from page 36*)

ROBERT ROUNDS, formerly field contact engineer of the A. Schrader's Son Division, Scovill Mfg. Co., Inc., Akron, Ohio, has been transferred to the Brooklyn office of the company as engineer in charge of the work simplification program.

Formerly managing director of Mason & Simonsen, Ltd., Perth, Western Australia, **LT.-COL. R. SIMONSEN** is in active duty as Chief Ordnance Mechanical Engineer, Western Command, Western Australia.

Formerly chief engineer of the Lawrance Engineering & Research Corp., Linden, N. J., **N. N. TILLEY** is now with the Studebaker Corp., South Bend, Ind., as chief engineer of a special engine project. Mr. Tilley is a member of the SAE Aircraft-Engine Activity Committee.

RICHARD W. FULTON recently became manager of the tire, battery, and accessory department of the Gulf Oil Corp., New York City. He had been assistant manager of the Merchandising Division of the same company.

MAJOR A. E. CHRISTIAN is now in active service with the Canadian Army, The Winnipeg Grenadiers, in charge of vehicle maintenance. In civilian life he was service manager of Breen Motor Co., Ltd., Winnipeg, Man., Canada.

ROBERT S. KIDD, formerly with the Mawen Motor Corp., New York City, is now layout draftsman on aircraft engines, Lycoming Division, The Aviation Corp., Williamsport, Pa.

JAMES MATTERN is a production specialist in the War Department, Office of the Quartermaster General, Motor Transport Service, Detroit.

Impromptu Speeches "Surprise" Meeting Treat

▪ Buffalo

IN PLACE of the usual guest speaker, ten prominent members and guests of the Buffalo Section were called upon to make impromptu speeches at the Section's June 3 meeting, in a special "surprise" program.

Among those heard at this session were:

Howard Thomas of the test pilot staff, Curtiss Airplane Division, Curtiss-Wright Corp., and formerly of Randolph Field, who spoke briefly on his experiences while training to be a pilot.

Elwood T. Larkin, chief engineer, Sterling Engine Co., who detailed the problems of retooling a shop to manufacture larger engines for the Navy.

Le Roy F. Maurer, assistant manager, Ordnance Department, Bell Aircraft Corp., who spoke on the subject "Wading Through Trouble," a discussion of the trouble which arose from demands for gun mounts and similar equipment.

Major Clyde H. Mitchell, U. S. Army Air Forces, who told some interesting tales of the work of the Ferry Command.

Laurence P. Saunders, chief engineer, Harrison Radiator Division, General Motors Corp., who discussed the problems surmounted by his company in changing from automobile radiators to military radiators, oil coolers, and inter-coolers, which are designed much more heavily than the equipment for the same purpose made for passenger cars.

Harry L. Chisholm, Jr., who recounted his early experience in learning how to spot weld aluminum; and

Paul Dubosclar, president, Farnham Mfg. Co., Buffalo, who spoke on high-speed milling of spars for bombers.

The meeting was closed by a showing of the colored film "Unfinished Rainbows," the story of the life of Charles M. Hall, founder of the Aluminum Co. of America.

"Marked" Tires May Come In Future, McGill Says

▪ Kansas City

IN order that a close check can be kept on tires and their use, it is not unlikely that tire casings will be marked in the future with such designations as "Military use," "Civilian use," or "Inter-City use," C. A. McGill, district manager, B. F. Goodrich Co., disclosed at the May 11 meeting of the Kansas City Section.

Answering the question, "Why the necessity of rationing tires?" Mr McGill pointed out that more than 32,000 various commercial items besides tires and tubes require some grade of rubber, and the Army and Navy are large users of rubber in the construction of tanks, ships, and various types of airplanes. During 1940, approximately 600,000 tons of rubber were used in the United States, Mr. McGill said, most of which came from the Malaya Peninsula and the Dutch East Indies. Today, it requires at least 105 days for a shipment to reach our ports, he said, adding that now most of the crude rubber had fallen into the hands of the enemy, anyway.

On the subject of synthetic rubber, Mr. McGill discussed use of "Ameripol" (made from crude oil and alcohol, or butadiene). He stated that the Phillips Petroleum Co. and the B. F. Goodrich Co. are working jointly, as are other companies, in developing this type of rubber, and that the government is financing large plants for its manufacture.

A demonstration was given showing the ease with which synthetic rubber can be made if the proper ingredients and facilities are available.

SAE Muskegon Club Formed

ON April 16 a group of SAE members in Muskegon met to form the SAE Club of Muskegon. The group elected officers and held their first technical meeting on May 21. Club officers are: chairman, Stuart Nixon, Sealed Power Corp., vice chairman, Paul S. Lane, Muskegon Piston Ring Co., and secretary-treasurer, Harold Rosen, owner, American Grease Stick Co.

At the first meeting of the Club, David Vail discussed "Castings Versus Forgings" as an optional method of manufacturing vital parts today.

Cleveland

FOURTEEN papers have been submitted this year in the Cleveland Section annual student paper contest in which the students of Case School of Applied Science, Fenn College, and General Motors Institute compete for prizes. The first prize is $15, the second $10, and the third $5, with a student membership in the Society going with each award.

The papers will be judged during the summer months, and the winners will be announced at the first fall meeting of the Section.

GM Institute – May 11

The Ethyl Gasoline Corp. was host to the student branches of the Detroit Section of the SAE. After an inspection trip in the afternoon, the members remained in Detroit for the evening meeting of the Detroit Section, at which Don R. Berlin and the Very Rev. Charles Cloud, S.J., were speakers.

University of Oklahoma – May

The final activity of the student chapter was in the form of an open meeting to promote interest and encourage SAE membership for the next year. The varied functions of the SAE were described by Mr. Haas, faculty adviser, while plans for next year's activities of the chapter were discussed. Among these are: a debate with the Oklahoma A&M student branch at the Fuels and Lubricants Meeting at Tulsa; joint meetings with the ASME; arrangement for an open-house exhibit; softball games; and the possible undertaking of a research project.

Those guests interested in joining the SAE were asked to indicate this fact on information blanks. After the blanks were collected one was drawn and a six-months' membership was awarded to the person whose name appeared.

Colorful Films Depict Wright War Efforts

■ *Indiana*

Concrete evidence of what two great aeronautical forces can do in days of grave war emergency was depicted by dramatic sound films at the May 21 meeting of the Indiana Section.

The two film subjects were: "Curtiss Answers the Call for Quantity," produced by the Curtiss-Wright Corp., Buffalo, N. Y., and "Wright Builds for Air Supremacy," produced by Wright Aeronautical Corp., Paterson, N. J. Dovetailing skillfully, the films gave the large engineering audience an overall picture of production of Wright engines and pursuit ships. Planes in flight and dramatic maneuvers added color to the presentation.

Student Group Inspects New Ethyl Laboratories

■ *Detroit*

NEW research laboratories of the Ethyl Gasoline Corp. were inspected by approximately 125 student members and professors of the Detroit Section, May 11. The group represented the colleges, universities, and technical schools in the Detroit area.

The operation of the Ward-Leonard principle of dynamometer control as employed in the laboratories was explained and demonstrated to the group, as well as the activities of the Road Test Section and the Gasoline Testing laboratory. A new version of the Ethyl Corp. film, "The Long Road" was also shown.

Following the inspection trip, the group attended the meeting of the Detroit Section at the Horace H. Rackham Memorial Building to hear the Very Rev. Charles S. Cloud, president of the University of Detroit, and Don R. Berlin, aeronautical engineer, General Motors Corp. (A report of this meeting was published in the June SAE JOURNAL, p. 42.)

APPLICATIONS Received

The applications for membership received between May 15, 1942, and June 15, 1942, are listed below. The members of the Society are urged to send any pertinent information with regard to those listed which the Council should have for consideration prior to their election. It is requested that such communications from members be sent promptly.

Baltimore Section

Stone, A. Rivington, principal draftsman, Aberdeen Proving Ground, Aberdeen, Md.

Buffalo Section

Alevizon, George V., draftsman, Bell Aircraft Corp., Buffalo.

Cunningham, Francis E., president, Cunningham-Hall Aircraft Corp., Rochester, N. Y.

Perkins, Charles E., superintendent, Plant No. 2, Houde Engineering, division of Houdaille Hershey Corp., Buffalo.

Canadian Section

Doyle, J. Rowland, layout draftsman and checker, General Motors of Canada, Ltd., Oshawa, Ont.

Godwin, Gordon, logging engineer, Quebec North Shore Paper Co., Montreal, Que.

Rolph, Ray C., sales manager, Willard Storage Battery Co. of Canada, Ltd., Toronto, Ont.

Wheeler, Robert V., inspector of aircraft, Royal Canadian Air Force, Technical Detachment, Montreal, Que.

Chicago Section

Boardman, Herbert L., tool and machine designer, Foote Bros. Gear & Machine Corp., Chicago.

Cox, Robert J., layout draftsman, Bendix Products Division, Bendix Aviation Corp., South Bend, Ind.

Doss, James C., U. S. Army Inspector, War Department, Washington, D. C. Mail: 5353 Broadway, Chicago.

Webber, Earl N., president, Joseph Weidenhoff, Inc., Chicago.

Young, Edward J., customer engineer, Bendix Products Division, Bendix Aviation Corp., South Bend, Ind.

Cleveland Section

Brown, Spencer D., assistant factory manager, Harris Products Co., Cleveland.

Buechling, W. J., chief metallurgist, Copperweld Steel Co., Warren, Ohio.

Cox, William, Jr., president, Elco Grease & Oil Co., Cleveland.

Heller, Joseph R., vice president and general manager, Elco Grease & Oil Co., Cleveland.

Peskin, Leonard C., director of spring mill products, American Steel & Wire Co., Cleveland.

Wheaton, Charles B., owner, Simplex Automotive Parts, Cleveland.

Dayton Section

Damron, Houston A., assistant mechanical engineer, U. S. Army Air Forces, Materiel Center, Wright Field, Dayton.

Detroit Section

Aland, Richard C., engineering checker, Bromley Engineering Co., Detroit.

Black, L. Russell, sales engineer, Monroe Auto Equipment Co., Monroe, Mich.

Bogan, Bernard W., engineer, Chrysler Corp., Detroit.

Cooperrider, Harold M., assistant chief, Tank & Combat Vehicle Division, War Department, Detroit Ordnance District, Detroit.

Dedrick, John H., Jr., metallurgical engineer, S. K. Wellman Co., Detroit.

Ford, Benson, executive, Ford Motor Co., Dearborn, Mich.

Fries, Hugo G., assistant chief designer, Donnelly Powers Engineering Co., Inc., Detroit.

Garrett, L. W., development engineer, Continental Motors Corp., Detroit.

Harshman, Donald, draftsman, Ford Motor Co., Dearborn, Mich.

Jeffers, Robert Herbert, time study man, Cadillac Motor Car Division, General Motors Corp., Detroit.

Maas, Benard L., sales manager, Broler-

ick Forge Co., Muncie, Ind. Mail: 731 Fisher Bldg., Detroit.

Mather, Roger Frederick, consulting metallurgist, Willys-Overland Motors, Inc., Toledo, Ohio.

McCarthy, George Daniel, Chrysler Corp., Highland Park, Mich.

Merz, Elroy Mathew, junior engineer, Ford Motor Co., Dearborn, Mich.

Miller, Glen A., president, general manager, Superior Metal Products Co., Auburn Heights, Mich.

Nair, Frank B., chief engineer, Falls Spring & Wire Co., Detroit.

Randall, Robert L., industrial engineer, 404 Boulevard Bldg., Detroit.

Roberts, W. Stewart, ordnance engineer, U. S. Army, War Department, Tank Engineering Office, Detroit.

Schulte, Gerard J., sales engineer, Mohun & Leininger, Detroit.

Tallberg, Valentine Y., engineer, Ford Motor Co., Dearborn, Mich.

Indiana Section

Hicks, Earl M., president, Hicks Body Co., Inc., Lebanon, Ind.

Kansas City Section

Chisholm, P. J., production superintendent, Keystone Trailer & Equipment Co., Kansas City, Mo.

Metropolitan Section

Alexander, Geoffrey N., research engineer, Armoured Fighting Vehicles Division, Ministry of Munitions, Australia. Mail: 15 Broad Street, New York City.

Budds, H. H., assistant general manager, Ranger Aircraft Engines, division of Fairchild Engineering & Airplane Corp., Farmingdale, L. I., N. Y.

Demarest, Edwin J., senior procurement inspector, U. S. Army, Army Air Force, Eastern Procurement District, Wright Aeronautical Corp., Paterson, N. J.

Hohorst, Henry, Jr., president and treasurer, Hohorst, Inc., Jersey City, N. J.

Kelly, John Edward, draftsman, Breeze Corporations, Inc., Newark, N. J.

Maloney, Joseph G., research, Wright Aeronautical Corp., division of Curtiss-Wright Corp., Paterson, N. J.

Mercy, Kenneth R., associate mechanical engineer, Navy Yard, Brooklyn, N. Y.

Mills, Hugh A., research engineer, Norma-Hoffmann Bearings Corp., Stamford, Conn.

Perry, Lawrence Henry, manager, New York office, S. K. Wellman Co., New York City.

Purdy, Robert W., detailer, Ranger Aircraft Engines, division of Fairchild Engineering & Airplane Corp., Farmingdale, L. I., N. Y.

Rentzel, Delos W., superintendent of communications, American Airlines, Inc., Municipal Airport, Jackson Heights, N. Y.

Turner, Luther W., sales engineer & manager, South American Division, Raybestos-Manhattan, Inc., New York City.

Waring, Robert W., materials engineer, Sperry Gyroscope Co., Inc., Brooklyn, N. Y.

New England Section

McMahon, Eugene Thomas, purchasing department, Fram Corp., Pawtucket, R. I.

Northern California Section

Coe, Francis, junior engineer, Joshua Hendy Iron Works, Sunnyvale, Calif.

Olsen, G. A., vice president and general manager, Sunland Refining Corp., Fresno, Calif.

Weiss, Virgil E., automotive engineer, Standard Oil Co. of Calif., San Francisco.

Wilkes, Thomas Marion, Major, U. S. Army, Third Infantry Division, Fort Ord, Monterey, Calif.

Northwest Section

BonDurant, George E., superintendent, Spokane Pacific Line, Spokane, Wash.

Graham, Oscar F., salesman, Colyear Motor Sales Co., Seattle, Wash.

Johnson, Louis P., salesman, Colyear Motor Sales Co., Spokane, Wash.

Park, Robert Hatherley, president, R. H. Park Mfg. Co., Auburn, Wash.

Thomasson, D. D., sales engineer, The Texas Co., Seattle, Wash.

Oregon Section

Deffenbaugh, John Raymond, engineering draftsman, U. S. Army Air Corps, Portland Air Base, Sub-Depot Engineering, Portland.

Pittsburgh Section

Creazzi, Harry O., engineer of special designs, Gulf Research & Development Co., Pittsburgh.

James, Louis Edward, sales engineer, Standard Oil Co. of Pa., Pittsburgh.

St. Louis Section

Marien, Melvin W., assistant chief engineer, Ramsey Accessories Mfg. Corp., St. Louis.

Muellerleile, Cecil E., city sales manager, Cities Service Oil Co., St. Louis.

Southern California Section

Anger, Rudolph, teacher, aircraft, Board of Education, George Washington High School, Los Angeles.

Baldwin, John D., Jr., engineer, The Weatherhead Co., Los Angeles.

Boeck, Percy A., manager, western division, Oakite Products, Inc., Los Angeles.

Devorn, Oleg J., stress engineer, Vega Aircraft Corp., Burbank, Calif.

Esterline, Herman L., automotive engineer, The Texas Co., Los Angeles.

Heath, William C., assistant chief engineer, Solar Aircraft Co., San Diego, Calif.

Johnson, Walter M., superintendent fleet maintenance and metal construction, Hal Roach Studios, Culver City, Calif.

Jones, H. Albert, methods engineer, Harvill Aircraft Die Casting Corp., Inglewood, Calif.

Kull, Charles J., liaison engineer, Consolidated Aircraft Corp., San Diego, Calif.

Montague, Kenneth E., aeronautical engineer, Consolidated Aircraft Corp., San Diego, Calif.

Smalley, Francis Willard, used truck foreman, International Harvester Co., Los Angeles.

Southern New England Section

Coar, Richard J., experimental test engineer, Pratt & Whitney Aircraft, division of United Aircraft Corp., East Hartford, Conn.

Robidoux, Conrad, inspector, salvage department, Pratt & Whitney Aircraft division of United Aircraft Corp., East Hartford, Conn.

Sutherland, Edward Anderson, experimental test engineer, Pratt & Whitney Aircraft, division of United Aircraft Corp., East Hartford, Conn.

Southwest Section

Adams, Clyde E., general manager, Guiberson Corp., Dallas, Texas.

Brockman, Carl F., supervisor of heat treat and plating, Guiberson Diesel Engine Co., Dallas, Texas.

Leutwyler, Edward T., Lt., U. S. Army, Office of Quartermaster, Camp Hood, Temple, Texas.

Zimmerle, Joseph P., production manager, Guiberson Diesel Engine Co., Dallas, Texas.

Washington Section

Barnitz, Fred B., special representative, Mack-International Motor Truck Corp., Washington, D. C.

Costello, John R., automotive engineer, War Department, Chief of Ordnance, Washington, D. C.

Davis, Tex, Lt., U. S. Army, Planning Division, Motor Transport, Washington, D. C.

Gerber, Lipman S., electrical engineer, U. S. Army, Ordnance Department, Tank & Vehicle Division, Washington, D. C.

Morris, William C., assistant automotive engineer, War Department, Office of Chief of Ordnance, Tank & Combat Vehicle Division, Washington, D. C.

Outside of Section Territory

Beck, Edwin Charles, service engineer, Sealed Power Corp., Muskegon, Mich.

Burks, George Edwin, chief engineer, Caterpillar Tractor Co., Peoria, Ill.

Casler, William A., research engineer, Caterpillar Tractor Co., Peoria, Ill.

Drury, William T., Jr., maintenance manager, Southeastern Greyhound Lines, Lexington, Ky.

Fox, Elton B., research engineer, Caterpillar Tractor Co., Peoria, Ill.

Pearce, Charles F., partner, Aero Engine Division, Standard Machine Works, St. James, Man., Canada.

Raettig, Alvin Ernest, Jr., Lt., U. S. Army, 2nd Battalion, 53rd Q.M.R., Fort Benning, Ga.

Thompson, George Anson, manager, overhaul plant, Canadian Pacific Air Lines, Ltd., Vancouver, B. C., Canada.

Vivian, Frank H., technical sales engineer, Four Wheel Drive Auto Co., Clintonville, Wis.

Woodcock, Melville T., flying officer, engineer, Royal Air Force, Volunteer Reserve, Greenwood, King's County, Nova Scotia.

Youngblutt, Sumner P., assistant mechanical engineer, U. S. Army Air Force, Continental Motors Corp., Muskegon, Mich.

NEW MEMBERS Qualified

These applicants who have qualified for admission to the Society have been welcomed into membership between May 15, 1942, and June 15, 1942.

The various grades of membership are indicated by: (M) Member; (A) Associate Member; (J) Junior; (Aff.) Affiliate Member; (SM) Service Member; (FM) Foreign Member.

Baltimore Section

Leuang, William Arthur (J) stress engineer, Glenn L. Martin Co., Baltimore (mail) 3309 Guilford Ave.

Buffalo Section

Kalish, David (J) layout draftsman, Curtiss-Wright Corp., Airplane Division, Buffalo (mail) 16 Enola Ave., Kenmore, N. Y.

Kellogg, Robert C. (J) engineer, Bell Aircraft Corp., 2050 Elmwood Ave., Buffalo (mail) 462 Kensington Ave.

Canadian Section

Adams, A. Herb (A) vice president, J. C. Adams Co., Ltd., 115 George St., Toronto, Ont.

Broad, F. Ralph (A) general manager, Canada Decalcomania Co., Ltd., 507 King St., E., Toronto, Ont.

Dawson, William (A) general manager, Brantford Coach & Body, Ltd., Brantford, Ont. (mail) 141 King St., Guelph, Ont.

Goulston, Bernard (M) chief chemist, general inspection department, Imperial Oil, Ltd., 445 Christina St., S., Sarnia, Ont.

Ley, Charles H. (A) sales manager, director, Dominion Wheel & Foundries, Ltd., 171 Eastern Ave., Toronto, Ont.

McGorman, Donald G. (J) superintendent, Schultz Die Casting Co. of Canada, Ltd., Toronto, Ont. (mail) Wallaceburg, Ont.

Chicago Section

Flatow, Gregory (A) garage superintendent, George McNeil Teaming Co., 540 N. Franklin, Chicago.

Mahaffay, Robert J. (J) field engineer, Chek-Chart Corp., 624 S. Michigan Ave., Chicago.

Suttle, W. C. (J) project engineer, Bendix Aviation Corp., South Bend, Ind. (mail) 1150 N. O'Brien St.

Teeple, **Charles Paul** (M) vice president, charge of research, development and control, Crane Packing Co., 1800 Cuyler Ave., Chicago.

Thompson, Albert L. (J) representative at Studebaker, Bendix Products Division, Bendix Aviation Corp., South Bend, Ind.

Cleveland Section

Chrysler, Robert W. (J) assistant engineer, National Bronze & Aluminum Foundry Co., E. 45th & Hamilton, Cleveland (mail) 50 Baker St., Berea, Ohio.

Fisher, Othal H. (M) chief engineer, National Bronze & Aluminum Foundry Co., E. 45th & Hamilton, Cleveland (mail) 536 Union Commerce Bldg.

Kuhnert, Glenn C. (M) specifications engineer, Bendix-Westinghouse Automotive Air Brake Co., 901 Cleveland St., Elyria, Ohio.

McKinney, R. C. (M) superintendent, aircraft, Cleveland Graphite Bronze Co., 16800 St. Clair, Cleveland.

Myron, Paul (J) designer, Pump Engrg. Service Corp., Cleveland (mail) 8221 Pulaski Ave.

Reid, James S. (M) president, Standard Products Co., 1011 Power Ave., Cleveland.

Thomas, Walter S. (A) maintenance engineer, Thompson Aircraft Products Co., 23555 Euclid Ave., Euclid, Ohio (mail) 988 Elbon Rd., Cleveland Heights, Ohio.

Van Epps, John N. (J) engineer (aircraft accessories), Thompson Products, Inc., 2196 Clarkwood Road, Cleveland.

Dayton Section

Nay, Paul Franklin, Capt. (SM) U. S. Army, Air Corps, Materiel Division, Wright Field, Dayton.

Peterson, David C. (M) works manager, Superior Engine Division, National Supply Co., Springfield, Ohio.

Schlub, Carl F. (J) junior mechanical engineer, U. S. Army, Air Corps, Wright Field, Dayton (mail) 117 Richmond Ave.

Wuellner, Richard W. (J) senior test engineer, Wright Aeronautical Corp., Division of Curtiss-Wright Corp., Cincinnati Division, Lockland, Ohio (mail) 8401 Wiswell Ave., Cincinnati.

Detroit Section

Bracken, D. J. (M) works manager, Fisher Body Pontiac Division, General Motors Corp., Baldwin Ave., Pontiac, Mich.

Drake, George A. (J) technical data, Oldsmobile Division, General Motors Corp., Lansing, Mich. (mail) 1905 Marion Ave.

Hittell, John L. (M) tool design engineer, Ex-Cell-O Corp., Detroit (mail) 13505 LaSalle, Apt. 100.

Kintigh, Lowell A. (M) project engineer, Oldsmobile Division, General Motors Corp., Lansing, Mich. (mail) 1519 W. St. Joseph St.

Kline, John Francis (J) critical materials analysis, Cadillac Motor Car Division, General Motors Corp., Detroit.

Lewis, James H. (J) standards engineer, Ternstedt Mfg. Division, General Motors Corp., 6307 W. Fort St., Detroit (mail) 640 Brady St., Dearborn, Mich.

Rogers, Harry L. (J) detailer and tool designer, Pioneer Engrg. & Mfg. Co., 19669 John R St., Detroit (mail) 11668 Forrer Ave.

Setz, Henry L. (J) detail project engineer, aviation development division, General Motors Corp., Detroit (mail) 12866 Strathmoor.

Temple, Robert B. (M) assistant chief engineer, Budd Wheel Co., 12141 Charlevoix Ave., Detroit.

Weisgerber, F. Rankin (M) manager, engineering contact division, Woodall Industries, Inc., 7565 E. McNichols Road, Detroit.

Zimmerman, John (M) project engineer, Continental Aviation & Engrg. Corp., 12801 E. Jefferson Ave., Detroit (mail) 2056 Hunt Club Drive, Grosse Pointe Woods, Mich.

Indiana Section

Brown, E. Verlin (A) liaison inspector, Curtiss-Wright Corp., Propeller Division, 1301 W. Morris St., Indianapolis, (mail) 946 N. Dearborn St.

McConnell, Charles K. (M) carburetor engineer, Delco Radio Division, General Motors Corp., Kokomo, Ind.

Smith, Malcolm A. (A) sales engineer, Perfect Circle Co., Hagerstown, Ind. (mail) College St.

Kansas City Section

Bondor, Frank M. (SM) aeronautical engineer, Civil Aeronautics Administration, Aircraft Airworthiness Section, City Hall Bldg., Kansas City, Mo. (mail) 6504 Charlotte St.

Metropolitan Section

Ahrens, Harry T. (A) technical supervisor, field service and research, Hygrade Products Co., Inc., 35-35 35th St., Long Island City, N. Y. (mail) 36-50 37th St.

Bennett, Arthur J. (A) fleet superintendent, General Diaper Service, Inc., 79-55 Albion St., Elmhurst, L. I., N. Y. (mail) 94-05 209th St., Bellaire, L. I., N. Y.

Ellis, J. Dean (M) consulting engineer, Chrysler Corp., 8101 W. Warren, Detroit (mail) 3926 Haverhill.

Goldman, Joseph (M) fire control designer, Sperry Gyroscope Co., Inc., Flatbush Ave. Extension, Brooklyn, N. Y. (mail) 3141 Arnow Pl., New York City.

Gubar, George (J) junior tool designer, Wright Aeronautical Corp., Division of Curtiss-Wright Corp., Paterson, N. J. (mail) 111 61st St., West New York, N. J.

Horbatt, Paul F. (J) junior test engineer, Wright Aeronautical Corp., Division of Curtiss-Wright Corp., Paterson, N. J. (mail) 609 Edel Ave., Maywood, N. J.

Moreton, Douglas H. (J) research engineer, Standard Oil Development Co., Bayway, N. J. (mail) 179 S. Harrison St., East Orange, N. J.

Robinson, Cecil S. (M) president, Robinson Aviation, Inc., 730 Fifth Ave., New York City.

Wilson, Carroll J. (M) chemical engineer, Standard Oil Development Co., Research Division, P. O. Box 243, Elizabeth, N. J. (mail) 639 Fairmont Ave., Westfield, N. J.

Northern California Section

Irving, G. Eldon (M) factory superintendent, Hammond Aircraft Co., Bayshore Highway, South San Francisco, Calif. (mail) 2509 Adeline Dr., Burlingame, Calif.

Railton, Edward E., Jr., (J) draftsman, Hall Scott Motor Car Co., Berkeley, Calif. (mail) 4509 Fairbairn Ave., Oakland, Calif.

Oregon Section

Higgins, Elliott B. (J) sales engineer, New Departure, Division of General Motors Corp., Seattle, Wash. (mail) 2889 S. W. Rutland Terrace, Portland, Ore.

Hlobil, Josef S. J. (M) president, general manager, Columbia Aircraft Industries, 512 S. E. Mill St., Portland, Ore.

Philadelphia Section

Benning, Walter F. (M) bus engineer, Mack Mfg. Corp., S. 10th St., Allentown, Pa. (mail) 1502 Union St.

Pittsburgh Section

Dillner, William J. (A) fleet supervisor, W. J. Dillner Transfer & Storage Co., 601-603 Melwood St., Pittsburgh (mail) 270 Beverly Rd.

Ference, Stephen (A) director of service, Chrysler Pittsburgh Co., Inc., 5625 Baum Blvd., Pittsburgh.

Jacobson, Eugene W. (M) design engineer, Gulf Research & Development Co., P. O. Drawer 2038, Pittsburgh.

Moorhead H. A. (M) metallurgical engineer, bar and semi-finished products, Carnegie-Illinois Steel Corp., 1207 Carnegie Bldg., 434 Fifth Ave., Pittsburgh.

St. Louis Section

Zenzen, John Andrew (M) field engineer, Herman Body Co., 4400 Clayton Ave., St. Louis, Mo.

Southern California Section

Barrie, Allan A., Major (A) U. S. Army, Air Force Ferrying Command, Foreign Wing, Hamilton Field, Calif.

Beeler, Frank M. (J) engineer, Aire-search Mfg. Co., Inglewood, Calif. (mail) 1168 S. Highland Ave., Los Angeles.

Cade, J. Weldon (J) designer, Sturgess, Inc., 533 State St., Glendale, Calif.

Cochrane, William Robert (J) senior weight computer, Lockheed Aircraft Corp., Burbank, Calif. (mail) 1711 W. Mangum St., Baldwin Park, Calif.

Dunholter, Howard Frank (M) engineer, Vultee Aircraft, Inc., Vultee Field, Calif. (mail) 901 Dolan St., Downey, Calif.

Hawkins, Douglas F. (M) designing, Peerless Pump Co., 301 W. Ave. 26, Los Angeles (mail) 4680 Northbridge Dr., Windsor Hills.

Kornblum, Alvin J. (J) assistant project engineer, Vega Aircraft Corp., Dexter-Horton Bldg., Seattle, Wash. (mail) 947 Hazenhurst Dr., Hollywood, Calif.

Seeds, Norton H. (A) supervisor, North American Aviation, Inc., Inglewood, Calif. (mail) 7001 B Seville Ave., Huntington Park, Calif.

Shaffer, Glenn C. (J) sales engineer, American Cable Division, American Chain & Cable Co., 2475 Porter St., Los Angeles.

Smith, Preston G. (J) assistant power plant engineer, Douglas Aircraft Co., Inc., El Segundo, Calif. (mail) 401 Fifth Pl., Manhattan Beach, Calif.

Stirton, Robert I. (M) research engineer, Union Oil Co. of Calif., Research Dept., P. O. Box 758, Wilmington, Calif.

Strauss, Harold H. (J) test engineer, Northrop Aircraft, Inc., Hawthorne, Calif. (mail) 527 San Vicente Blvd., Santa Monica, Calif.

Southern New England Section

Clingan, William C. (A) district sales manager, SKF Industries, Inc., 211 Capitol Bldg., Hartford, Conn. (mail) 410 Asylum St.

Southwest Group

Fischer, William P. (J) aircraft designer, North American Aviation, Inc., Inglewood, Calif. (mail) 1018 N. Clinton Ave., Dallas, Texas.

Maleev, Vladimir L. (M) professor, research mechanical engineering, Oklahoma Agricultural & Mechanical College, Stillwater, Okla.

Smith, A. D. (A) motor truck salesman, International Harvester Co., Oklahoma City, Okla. (mail) 2524 W. Park Pl.

Washington Section

Hajewski, Cyril M. (J) automotive engineer, U. S. Army, Ordnance Department, Washington (mail) R.F.D. No. 5, Box 732, Anacostia, D. C.

Haroldson, Hugh W. (J) assistant marine engineer, U. S. Maritime Commission, Performance Section, 7828 Commerce Bldg., Washington (mail) Apt. 7, 1537 Key Blvd., Arlington, Va.

Schwarz, Albert P. (A) statistical clerk, U. S. Army, Ordnance Department, Washington (mail) 4218 N. Second Rd., Arlington, Va.

Whetzel, Carl Sanford (A) sales engineer, S. J. Meeks' Son, 622 G St., N.W., Washington (mail) 2315 Lincoln Rd., N.E., Apt. No. 105.

Outside of Section Territory

Engstrom, W. A. (M) experimental engineer, Continental Motors Corp., Muskegon, Mich. (mail) 1715 Davis St.

Zaumeyer, Lawrence M., Lt. (A) assistant motor maintenance officer, Salt Lake Army Air Base, Salt Lake City, Utah.

Foreign

Abbott, Robert Lyndsay (J) engineer, General Motors-Holden's, Ltd., P. O. Box 1714, Melbourne, Australia.

Materials Shortages

(*Concluded from page 41*)

copper production comes from 15 mines, and it takes 270-odd mines to produce the remaining 1½%.

Collection and careful segregation of copper and brass scrap is imperative, as is the need for careful planning and for substitution of less scarce material to avoid the use of copper wherever possible.

This year 1,800,000 tons of copper will come from domestic production and imports. Recovery of scrap should add approximately 300,000 tons to our store. We consumed in 1939 about 800,000 tons for civilian uses. From here out, non-essential civilian users cannot expect to obtain any copper, and only a necessary minimum amount will be available for essential non-military needs.

The government is spending more than $180 million for copper development and private capital has supplied some $40 million more.

• **TIN:** The U. S. has consumed for years between 80,000 and 100,000 tons of tin a year, with the bulk of it going into tin cans. Practically all of that tin was imported, largely from Malaya and the Netherlands East Indies.

We have now turned to Bolivia for ore, which now is being smelted along with ore in our stockpile in the new government smelter in Texas. We have a sizable stockpile of tin; we are getting some 18,000 tons a year from Bolivia, and we are picking up small quantities here and there around the world. But we cannot expect to get more than a fraction of our normal consumption, and rigid conservation is vital. Soldiers and sailors must be fed to a large extent from tinned containers. Glass and fiber containers are going to replace tin to a large extent for civilian use.

• **CHEMICALS** do not represent an industry in the sense that steel does. The chemicals industry, rather, is a generic term for a group of industries which use chemicals in their manufacturing processes. There are more than 800 chemicals under supervision or control by WPB.

Chemicals in modern warfare: Smokeless powder, synthetic rubber, aerial bombs, poison gas, explosives generally, protective coatings, and a thousand other things, depend upon chemicals.

The government and private industry are spending more than a billion and a half dollars in expansion of chemical plants. Private capital is providing $245 million of this amount.

Examples of the impact of war upon chemicals: Demand for toluol has increased 240% over the 1939 demand; industrial alcohol, 130%; chlorine, 83%; fixed nitrogen, 260%. These demands are increasing in certain categories and it is a constant race for producers of basic chemicals to keep up with the constantly increasing demand.

Some of the major chemicals in which shortages exist today are: natural and synthetic ammonia; butadiene, styrene and other chemicals for synthetic rubber; sodium nitrate for fertilizer; chlorine, phenol, toluene, oleum, aniline, benzol, coal tar products, fats and oils, and glycerine. (See "Materials Squeeze Gets Tighter," p. 42.)

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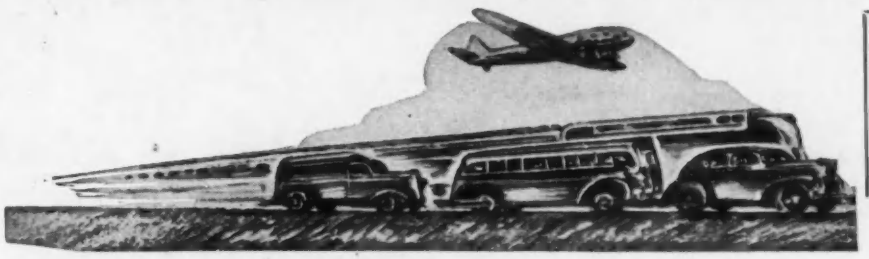


News of the **SEPTEMBER** *Issue*

By Norman G. Shidle

A Great Gang!

MANY months ago, O. E. Hunt said that automotive engineers would have to follow into the war zones the equipment which they then were producing and helping to design. Constant contact with service conditions, maintenance needs and performance requirements would be just as necessary, he emphasized, as similar peacetime contact on passenger cars with dealers, repair shops, and owners.

Already that prophecy is coming true in full measure. Either as civilians or as officers of our armed forces, SAE members for months have been observing . . . testing . . . helping, in every theatre of war where American equipment is performing. Some of these missions – like that of President A. W. Herrington with the Louis Johnson mission to India – are known publicly.

Scores of others on land, on sea, and in the air must remain unheralded until the whole war job is done. Alaska, Libya, Australia – and, of course, England – have already been visited on war assignments by important technicians with whom we have worked and played for many years. On and over the Atlantic and the Pacific, experimental results have been obtained and correlated by SAE men and brought back to home laboratories to influence design improvements in combat materiel, or to shape the outline of new protective or offensive devices.

All this, while day after day . . . week after week . . . month after month . . . a majority of SAE engineers are doing equally important jobs right at home. Hundreds of SAE men were involved in designing and building the transportation and the tools which fellow - member Jimmy Doolittle used on his thrilling trip from Shangri-La to Tokyo and return.

The war is young yet. It's time for fighting, not for tributes. But SAE men already are piling up achievements in the field and on the home front of which their associates . . . and America . . . are justly proud.

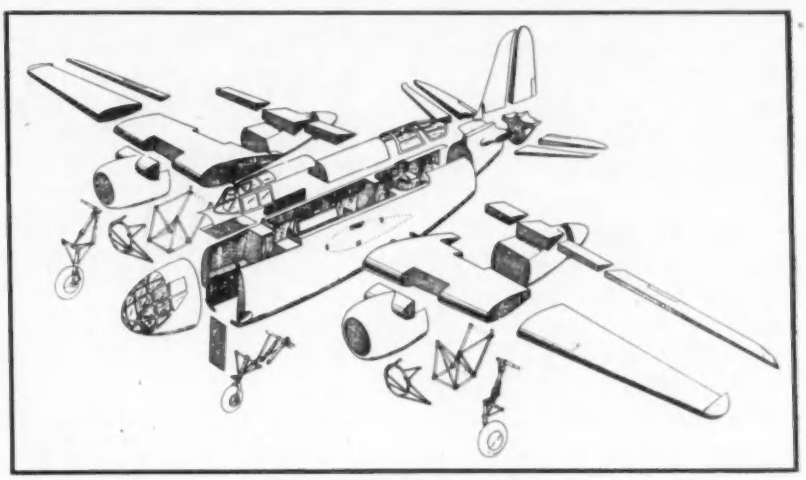
Job Breakdown Illustrations Speed Output of Airplanes

BELIEVING firmly in Confucius' maxim that "a picture is worth 10,000 words," the aircraft engineering departments of Douglas Aircraft Co. have enlisted artists to speed the production tempo.

Engineer-artists, versed in perspective engineering drawing, are eliminating the necessity for blueprint reading by the vast army of newcomers being trained to assemble aircraft, by picturizing every step in a particular assembly job. Illustration "job tickets" give each man a clear picture of the local structure as he will see it on the airplane, showing where the sub-assemblies and parts are to be attached in accordance with a numerical operation sequence. The average new worker, after a few moments' study of a drawing, can understand precisely what the results of his work will look like and how to achieve these results.

According to author George Tharratt, Douglas Aircraft Co. first introduced this method in August, 1939, when making a military airplane bid. Since then it has proved a tremendous success.

In the September SAE Journal, Mr. Tharratt reveals the inside workings of this modern instruction method. "Production Breakdown Illustration" will provide fascinating reading.



"Production breakdown diagram" of DB-7 twin-engine attack bomber. It depicts in a simple, easily understood perspective drawing the operations necessary to assemble the aircraft.

FIELD EDITORS

SAE Journal Field Editors report monthly for SAE Journal readers the technical news revealed in papers and discussions at Society Section meetings throughout the country. Selected by SAE Section Chairmen for their special ability to interpret engineering information briefly and effectively, these men make the "News of the Society" pages of the SAE Journal a mine of up-to-the-minute automotive technical data.

Baltimore – J. F. Rowley
Buffalo – George W. Miller
Canadian – Warren B. Hastings
Chicago – Austin W. Stromberg
Cleveland – R. S. Huxtable
Dayton – T. B. Holliday
Detroit – W. F. Sherman
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Milwaukee – L. L. Bower
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No. California – Trescott S. White
Northwest – Lee Ketchum
Oregon – Z. C. R. Hansen
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Pittsburgh – Murray Fahnestock
St. Louis – Roy T. Adolphson
So. California – Harold W. Ager, Jr.
So. New England – J. A. Clark
Syracuse – No Appointment
Tulsa Group – W. F. Lowe
Washington – G. B. Lacy

New CFR Report Points Way To Fuel Savings

AT a time when the entire nation is making every effort to save gasoline, the new CFR (Cooperative Fuels Research) report, to be published in the September SAE Journal, is most welcome. The third in six years, this report reveals data that further extend the precision with which "knock" . . . that No. 1 gasoline and power waster . . . can be determined and, therefore, avoided.

Since every automobile engine is designed fundamentally to operate most efficiently on a fuel of given octane number, any information that will permit fuels to be fitted to the engine with greater precision, will improve the operating efficiency of the engine, giving additional miles for every precious gallon of gasoline.

Here is another of the hundreds of research jobs automotive engineers are doing to carry us through this critical war era.

Review Problems of Six-Wheel Braking

ARE six-wheel trucks hard to stop? How well does the braking system on this type of vehicle operate? Experience of certain operators has led engineers to pose these questions.

In the September SAE Journal, Messrs. Horine and Benning, Mack Mfg. Corp. engineers, step forward with straight-from-the-shoulder answers.

Far from presenting a more difficult problem than other types, the six-wheeler can be made to give better braking performance than any, the authors contend. Six-wheelers are less likely to skid than either the four-wheeled straight trucks or tractor-semi-trailers, they go on to say, and in general stopping ability six-wheelers rate high.

The authors do admit difficulty of "bogie-hopping," but point out that this undesirable condition can be overcome by employing a bogie which is torsionally balanced.

"Six-Wheel Braking and Its Related Problems" gives fleet men sound technical advice on how to keep six-wheelers rolling safely in all kinds of weather.

'Pincer' Tactics Used in Gear Designing

WORLD WAR II has taught the value of the "pincer" movement. By attacking the enemy from both flanks at once a break-through is made possible, and the opposing force can be surrounded and annihilated at will.

Much the same principle has been used in trying to lick the problem of automotive gear design. The lubricant designer and the machine designer have been pulling a joint "pincer" play to eliminate the difficulties that stand in the way of optimum performance.

As J. O. Almen of GM Research Laboratories says in the September SAE Journal: "Study of the driving force of gears, of the unit pressure on the contact area of the mating gear teeth, and of the anti-welding characteristics of the lubricants helps to point the way to reduction of the burden for the lubricant, or alternatively, to permit the use of smaller, lighter, and cheaper gears."

Such an engineering "pincer" play is not a blitz tactic, but war needs have greatly speeded this particular cooperative research effort. Learn all the details of this pincer technique – in J. O. Almen's September SAE Journal article!

THE

NOVEMBER SAE JOURNAL

will be a

Special

Aeronautical Issue

TIME: 1972

"AWAY back in 1942, automobile engines were up in front because they were so heavy you couldn't handle the car at high speeds if they were in the rear. Furthermore, so much of the heat had to be taken out through the radiator that it had to be out there in front to get enough air for cooling. Cooling by fan alone was prohibitive because of lack of power.

"Believe it or not, as much as a third of the heat of the fuel was wasted through the cooling system back in those days . . . 30 years ago."

No, the SAE Journal editorial office hasn't been invaded by the little green men. But T. A. Boyd, Research Laboratories, General Motors Corp., has been projecting his imagination 30 years into the future. Look what else he came up with for the September issue:

Today (1972) we have engines in the rear; liberal use of aluminum and magnesium in the body structures; non-rusting iron, because we have found a really effective means of keeping oxygen from devouring ferrous metal; completely non-shattering, non-splintering glass, much superior to the so-called "safety glass"; fuels of better than 100 octane rating; glareless night driving; and scores of other improvements.

This isn't a Sunday supplement story, but one grounded in a rich technical background of facts. SAE Journal readers are in for an exciting treat in September when they read "The 1972 Model – I'd Like to Drive It."